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THE EFFECT OF WARM COMPRESS THERAPY IN REDUCING HEADACHE INTENSITY AND STABILIZING BLOOD PRESSURE IN HYPERTENSION PATIENTS

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ABSTRACT
Hypertension is a global health concern, increasing annually. Headaches in hypertensive patients indicate high blood pressure levels, affecting brain blood vessels. These headaches should be promptly evaluated and treated for significant health risks. Objective: This study investigates the impact of warm compresses on headache and blood pressure reduction in hypertensive patients. Method: The study, conducted at a community health center in Ngawi Regency, focused on hypertension patients with headaches. The researchers used a one-group pretest posttest design and measured headache pain using the NRS scale before applying a warm compress. Data analysis for this study was conducted using the Wilcoxon Signed-Rank Test. Results: The research results show that the average pain level decreased by 1.18, indicating a significant difference before and after the application of a warm compress. This study also shows that the average systolic blood pressure decreased by 15.87, indicating a significant difference (p-value <0.05) before and after the application of a warm compress. Additionally, the average diastolic blood pressure decreased by 13.27, indicating a significant difference (p-value <0.05) before and after the intervention. Conclusions: there is a significant effect of warm compresses on headache pain and on lowering blood pressure in patients with hypertension.

Keywords: blood pressure stabilization; headache intensity; hypertension patient; pain management; warm compress therapy

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INTRODUCTION

Hypertension or high blood pressure, also known as "The Silent Killer," is one of the most common chronic diseases in the world today, posing a global health problem and one of the main risk factors for cardiovascular diseases (Nurdini & Habibah, 2024; Riyani, 2022). The current definition of hypertension is a systolic blood pressure ≥ 130 mmHg and/or a diastolic blood pressure ≥ 80 mmHg (Iqbal & Jamal, 2023). Hypertension is one of the factors causing atherosclerotic cardiovascular disease, heart failure, stroke, and kidney damage After receiving a hypertension diagnosis, one must immediately start treatment to manage their blood pressure, avoid complications, and reduce symptoms that may arise, such as headaches, chest pain, blurred vision, nausea and vomiting, difficulty breathing, dizziness, confusion and disorientation, nighttime headaches, nosebleeds, arrhythmia, tinnitus, tremors, irritability, and others (Seed, 2024; World Health Organization (WHO), 2023, 2024).

According to World Health Organization (WHO) (2023), approximately 1.28 billion adults worldwide currently suffer from hypertension, with nearly two-thirds living in low- and middle-income countries. There are still many undiagnosed individuals, and concerning estimates suggest that around 46% of adults with hypertension are unaware of their condition.

Based on the Basic Health Survey (Riskesdas), it is explained that the prevalence of hypertension in Indonesia increased by 8.3% from 2013 to 2018 (Kemenkes RI, 2013, 2018). The prevalence of hypertension sufferers in East Java in 2018 showed an increase compared to the Riskesdas data from 2013, amounting to 10.1% (Kemenkes RI, 2013, 2018). Based on data from the Ngawi District Health Office in 2020, there were 40,134 cases of hypertension (Dinas Kesehatan Ngawi, 2018). Based on data from the Kasreman Community Health Center in November 2023, there were 517 cases of hypertension (Rekam Medis Puskesmas Kasreman, 2023).

Signs and symptoms in hypertensive patients include headaches, dizziness, vertigo, difficulty breathing, epistaxis, tinnitus, insomnia, confusion, fatigue, nausea and vomiting, decreased libido or sexual desire, and blurred vision (Lee, 2022). Headaches in patients with hypertension can be an important indicator of very high blood pressure levels, especially in patients with blood pressure exceeding 180/120 mmHg (Mohammadi et al., 2021). This headache, often described as pulsating and located on both sides of the head, can worsen with physical activity and may be accompanied by other concerning symptoms such as chest pain, shortness of breath, and blurred vision (Baraness & Baker, 2023). The mechanism of headache in hypertensive patients occurs due to increased intracranial pressure affecting the blood vessels in the brain. Therefore, headaches in hypertensive patients should not be ignored, as they can be a sign of significant health risks that require immediate evaluation and treatment.

The management of hypertensive patients includes pharmacological and non-pharmacological approaches (Grazzi et al., 2021). Pharmacological treatment that can be administered to patients with headaches is the administration of analgesics. This condition can help individuals reduce headaches. This situation can also lead to negative consequences, especially if the patient becomes dependent on the medication and feels anxious when not taking it (Milani & Davis, 2023). In addition, the non-pharmacological treatment often used is a warm compress. Some of these non-pharmacological treatments that can be applied to the general public include warm compresses, music therapy, and deep breathing relaxation. This is because it is cheap and efficient in its implementation (Rohmawati, 2021).

One of the management strategies that can be implemented to reduce headache intensity and lower blood pressure is by applying a warm compress. Based on the theory proposed by (Susanto et al., 2015), the effect of warm compress therapy is to reduce pain and increase blood flow. Warm compresses are a method that utilizes local heat of 45-50°C and are believed to produce various physiological effects. Warm compresses are one of the pain relief methods by providing heat energy through conduction, where heat causes vasodilation (widening of blood vessels), which can increase muscle relaxation, improve blood flow, and enhance the absorption of oxygen and nutrients into the brain tissue (Setyawan & Kusuma, 2014). The application of warm compresses has the benefit of increasing blood flow to the painful area, thereby helping to reduce headache pain, and aims to reduce the intensity of headaches in hypertensive patients (Setyawan & Kusuma, 2014; Susanto et al., 2015). Rohimah & Kurniasih (2025) research found a significant impact on pain levels in hypertensive patients before and after the application of warm compresses. Pratama (2022) also explains that there is a significant difference in blood pressure before and after warm compress therapy with a p-value of 0.000.

Based on a simple field study through interviews on November 18, 2023, with 5 respondents suffering from hypertension, it was found that 2 respondents who experienced headaches due

to hypertension said the first action they took was to consume Panadol, and 3 other respondents revealed that they performed "kerokan" when headaches appeared. When asked if the respondent had ever used a warm compress to relieve headaches and lower blood pressure, the respondent answered that they had never done so. Based on this phenomenon, the aim of this research is the effect of warm compress on headache and blood pressure reduction in hypertensive patients.

METHOD

The study approach is quasi-experimental, utilizing a one group pretest posttest design, in which each participant is watched both prior to and following the implementation of the intervention. The research was conducted at an outpatient clinic in one of the community health centers in Ngawi Regency from February to June, targeting hypertension patients experiencing headaches. A total of 38 participants were selected through purposive sampling, meeting the inclusion criteria of being hypertensive patients with blood pressure ≥ 140/90 mmHg; diagnosed by a doctor; experiencing headaches; aged 35-55 years, divided into early adulthood 35-45 years and late adulthood 46-55 years; and willing to be respondents. Informed consent was obtained from all participants before they were included in this study.

Researchers conducted a study at the general outpatient clinic and participated in PROLANIS (Chronic Disease Management Program) activities to gather respondents. Patients with hypertension who meet the inclusion criteria are then provided with an explanation of the purpose and objectives of the research, as well as an overview of the warm compress procedure that will be performed, and subsequently fill out the informed consent form to become respondents. The researchers measured the respondents' headache pain scale using the NRS scale and checked their blood pressure before applying a warm compress. Before the respondents marked the measuring tool, the researchers explained the NRS scale prior to the intervention. For example, the researchers showed the NRS sheet and then explained the meaning of the numbers 1-10, where 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain. After providing the explanation, the researchers asked the respondents to point to the number that roughly represented the level of pain they were experiencing. After the respondents marked the measuring tool, the researcher applied a warm compress with WWZ (Water Warm Zack), using water at a temperature of 45°-50°C, which was measured with a water thermometer for 15-20 minutes. It was then placed on the neck area while the respondents were seated. After the respondents were given a warm compress, one minute later the researcher asked them to determine the level of pain they felt with guidance from the researcher following the intervention. For example, the researcher showed the NRS sheet, then explained the meaning of the numbers 1-10, where 1-3 indicates mild pain, 4-6 indicates moderate pain, and 7-10 indicates severe pain. After providing the explanation, the researcher asked the respondents to point to the number that approximately represented the level of pain they felt, in order to measure the pain scale of the respondents' headaches after receiving the warm compress. After that, the respondents underwent blood pressure measurement. Warm compress therapy is conducted once for each respondent every two weeks, or it may be extended if the sample size has not been met.

The research instruments used in this study are the numeric rating scale (NRS), a hot water bottle, and warm water. Warm water in this study is the main material used by the researchers because the function of warm water will be analyzed to see how much influence it has on reducing the level of headache. The warm water used has a temperature between 45°-50° C. In this study, a hot water bag is used as a compress, where the bag is filled with warm water and placed on the neck. A water thermometer is used in this research to measure the

temperature of the water used, which is between 45°-50° C. The level of pain is measured using the Numerical Rating Scale, which serves as a guideline for observing the level of headache pain in patients with hypertension. This numerical scale is divided into a scale of 1-10, where 1-3 means mild pain, 4-6 means moderate pain, and 7-10 means severe pain. Blood pressure measurement using a calibrated digital sphygmomanometer. Next, the measurement results are recorded on the observation sheet.

Data analysis for this study was conducted using the Wilcoxon Signed-Rank Test, a non-parametric statistical method suitable for comparing two related samples. This test was employed to evaluate the differences in headache intensity and blood pressure measurements before and after the intervention of warm compress therapy among hypertensive patients. The Wilcoxon Signed-Rank Test was chosen due to its effectiveness in handling non-normally distributed data, which is often the case in clinical studies involving subjective measurements such as pain levels. A significance level of $\alpha = 0.05$ was set for the analysis. The results of the test provided insight into the efficacy of warm compress therapy in reducing headache intensity and lowering blood pressure, helping to determine whether the observed changes were statistically significant.

This research adheres to ethical guidelines in research, ensuring that all participants give their consent before being included. The research protocol has been reviewed and approved by the Health Research Ethics Committee of STIKES Bhakti Husada Mulia No. 009/E-KEPK/STIKES/BHM/VI/2024. Participants are informed of their right to withdraw from the research at any time without any consequences. Confidentiality was maintained throughout the research, and all data was anonymized to protect the participants' identities. In addition, this research ensures that there is no physical or psychological harm inflicted on participants during the intervention.

RESULT

Tabel 1.
Distribution of Respondents Based on Gender, Age, Education Level, and Occupation of Hypertension Patients (n=38)

Variable	f	%
Gender		
Male	9	23,7
Female	29	76,3
Age		
35-45	11	28,95
46-55	27	71,05
Educational Level		
Elementary School	26	68,42
Junior High School	7	18,42
Senior High School	4	10,53
Bachelor's Degree	1	2,63
Jobs		
Farmer	23	60,53
Private Sector	4	10,53
Housewife	11	28,94
History of hypertension		
Yes	27	71,1
No	22	28,9

Table 1, it was found that the majority of hypertension sufferers are female (76.3%), with most of them aged between 46-55 years, accounting for 71.05%. The majority of respondents have an elementary school education, totaling 68.42%. The most common occupation is farming, at 60.53%. Most respondents have a history of hypertension (71.1%)

Table 2.
Distribution of respondents based on pain levels and blood pressure before and after warm compress intervention in Hypertensive Patients (n=38)

Variable	f	%
Pain Level		
Before Intervention		
Mild	5	13,2
Moderate	24	63,2
Severe	9	23,7
After Intervention		
Mild	10	26,3
Moderate	26	68,4
Severe	2	5,3
Blood Pressure		
Before Intervention		
Systolic		
Stage 1 Hypertension	8	21,1
Stage 2 Hypertension	20	52,6
Stage 3 Hypertension	10	26,3
Diastolic		
Stage 1 Hypertension	14	36,8
Stage 2 Hypertension	10	26,3
Stage 3 Hypertension	13	34,2
After Intervention		
Systolic		
Pre-Hypertension	1	2,6
Stage 1 Hypertension	17	44,7
Stage 2 Hypertension	15	39,5
Stage 3 Hypertension	5	13,2
Diastolic		
Pre-Hypertension	11	28,9
Stage 1 Hypertension	14	36,8
Stage 2 Hypertension	11	28,9
Stage 3 Hypertension	2	5,3

Based on the table 2, the majority of hypertension patients experienced moderate pain both before and after the intervention, at 63.2% and 68.4%, respectively. However, mild pain increased from 13.2% to 26.3%. Additionally, the severe pain reported by patients decreased from 23.7% to 5.3%. On the other hand, the blood pressure before the intervention indicated that the majority of respondents experienced stage 2 hypertension for systolic blood pressure (52.6%) and stage 1 hypertension for diastolic blood pressure (36.8%). The blood pressure after the warm compress intervention showed that the majority of respondents experienced stage 1 hypertension for both systolic blood pressure (44.7%) and diastolic blood pressure (36.8%). Significant changes also occurred after the intervention, with a decrease in blood pressure to pre-hypertensive levels for both systolic and diastolic measurements.

Table 3.
The Effect of Warm Compress on Headache in Hypertensive Patients (n=38)

Pain level	Mean	Std. Deviation	Min-Max	*p-value*
Pre-Test	5,55	1,370	3-9	0,000
Post-Test	4,37	1,217	2-8	

Based on Table 3, it shows that the average pain level before therapy was 5.55±1.37 and after the intervention was 4.37±1.217. The minimum pain score decreased after therapy from 3 to 2, and the maximum pain score also decreased after therapy from 9 to 8. Each individual has a different tolerance level for pain, so the subjective response to headache relief may vary. This can affect the results measured through the pain intensity scale. Based on the results of the bivariate test, there is a significant effect of warm compresses on headache pain in patients with hypertension (p value = 0.000, α = 0.05).

Table 4.
The Effect of Warm Compress on the Reduction of Systolic and Diastolic Blood Pressure in Hypertensive Patients (n=38)

Blood Pressure	Pretest (Mean±SD)	Posttest (Mean±SD)	*p-value*
Systolic	172,45±16,63	156,58±14,19	0,000
Diastolic	104,32±11,14	91,05±8,94	0,000

Table 4, it shows that the average systolic blood pressure before the intervention was 172.45, and after the intervention, it was 156.58. Meanwhile, the average diastolic blood pressure before the intervention was 104.32, and after the intervention, it was 91.05. Both systolic and diastolic blood pressure showed a decrease after warm compress therapy. The results of the bivariate test indicate that warm compresses have a significant effect on lowering blood pressure in patients with hypertension.

DISCUSSION

The effect of warm compresses on the intensity of pain in hypertension patients

The results of this study indicate that before the intervention with warm compresses was conducted, many respondents reported moderate pain. Researchers apply a warm compress to the area causing a headache, such as the back of the neck or forehead, to improve blood circulation and relax tense muscles. The ideal temperature is 37-40°C. The researchers use a pain measurement scale like the Visual Analog Scale (VAS) to measure effectiveness. Each patient's response to a warm compress varies, and adjustments are made to ensure optimal results, such as duration, temperature, and therapy frequency. This is in line with the research conducted by Purwandari (2024) which involved applying a warm compress to the neck area for three consecutive days. Initial assessment showed an average pain scale of 5.43 on the first day, which decreased to a pain scale of 2 on the third day. This decrease illustrates the effectiveness of warm compress therapy in reducing headache symptoms related to hypertension, indicating that this intervention can enhance the comfort and quality of life for patients. Mild pain is usually defined as pain that disrupts daily activities but is still tolerable. Pain at this level often requires management, either through pharmacological or non-pharmacological methods, such as warm compresses. In this case, the moderate pain experienced by the respondents could be caused by various factors, including muscle tension, high blood pressure, or underlying health conditions such as hypertension. An increase in blood pressure can cause tension in the blood vessels and muscles in the neck, shoulders, and head area, leading to the onset of moderate pain. The results of the pre-test indicate that the majority of respondents experienced moderate pain, providing a baseline picture of the respondents' initial condition before the warm compress intervention. This emphasizes the need for management to reduce pain levels, and the final results of the research will show how effective warm compresses are in alleviating that pain.

Headaches are a common symptom experienced by individuals with hypertension. The increase in blood pressure causes the blood vessels in the brain to become tense, which then leads to pain. To address this, non-pharmacological interventions such as warm compresses

can be an effective and safe option. Using a warm compress not only provides a relaxing effect but can also help relieve headaches through several mechanisms. Warm compress therapy is one of the non-pharmacological interventions in managing headaches in hypertensive patients. It works by inducing vasodilation, which widens blood vessels, increases blood flow to the affected area, and reduces tension (Nurhanifah et al., 2022; Vitriya et al., 2022). This can alleviate headaches caused by muscle tension commonly experienced by hypertensive patients (Oktavia et al., 2024; Yuniawati & Sari, 2024). Research shows that applying a warm compress to the neck and head area can significantly reduce headache intensity for three days (Vitriya et al., 2022). Consistent application can yield cumulative benefits. Warm ginger compresses, which have soothing properties, can also help lower blood pressure (Nurhanifah et al., 2022). This therapy can provide various goals for hypertensive patients, including pain management and improved quality of life (Oktavia et al., 2024; Yuniawati & Sari, 2024). Healthcare providers should consider incorporating warm compress therapy into a comprehensive hypertension management strategy to ensure patients have access to effective non-pharmacological options for relieving headaches. The results of this study indicate that although the effectiveness level of warm compress therapy is only 21%, this intervention remains significant in reducing headache levels in hypertensive patients. Measured pain reduction provides evidence that this therapy can be an effective additional option in non-pharmacological pain management.

The results of the bivariate test indicate a decrease in the average pain scale before and after the application of warm compress therapy, and after conducting the Wilcoxon test using the SPSS program, a p-value of ($0.00 < \alpha = 0.05$) was obtained. This shows that warm compress therapy has a positive impact on reducing headaches in patients with hypertension. The research supports Koizier's theory that warm compresses can relieve pain, improve circulation, and provide comfort. Heat transfer occurs through conduction from warm water to certain areas of the body, causing blood vessels to dilate and blood flow to increase. This reduces headaches in patients with hypertension. Warm compress therapy reduces pain levels in headaches, relaxes muscles, and inhibits the release of inflammatory mediators, decreases nociceptor sensitivity, and increases pain thresholds.

The effect of warm compresses on blood pressure reduction in hypertensive patients

The results show that the blood pressure before the warm compress was an average systolic blood pressure of 172.45 mmHg and a diastolic blood pressure of 104.32 mmHg. This is in line with the research by T.Bolon et al. (2023), which explains that before receiving warm compress therapy, the majority of respondents had blood pressure categorized as moderate. Both values fall into the category of stage 2 hypertension according to the blood pressure classification by WHO, where systolic pressure is above 160 mmHg and diastolic pressure is above 100 mmHg. Systolic blood pressure is the pressure on the artery walls when the heart contracts and pumps blood throughout the body, while diastolic is the pressure when the heart rests between contractions. In conditions of hypertension, this pressure increases due to tension in the blood vessels, which can be caused by various factors such as stress, an unhealthy diet, or a sedentary lifestyle. At a systolic value of 172.45 mmHg and a diastolic value of 104.32 mmHg, an individual is at high risk of experiencing serious complications, such as heart disease, stroke, or damage to other organs like the kidneys. Chronic high blood pressure is often accompanied by symptoms such as headaches, dizziness, and fatigue.

The results of this study also indicate that the average blood pressure decreased after the warm compress intervention. This is in line with research conducted by Sridani et al. (2021) that warm red ginger compresses are effective in reducing systolic and diastolic blood

pressure in hypertensive patients. Warm compress therapy is one of the non-pharmacological methods to address hypertension and its symptoms, particularly in lowering blood pressure. This therapy induces vasodilation, which widens blood vessels, increases blood flow, and enhances the delivery of oxygen to tissues. This can lead to a decrease in overall blood pressure levels, with research indicating an average reduction of about 3.94 mmHg for systolic pressure and 3.88 mmHg for diastolic pressure after heat exposure (Pizzey et al., 2021).In addition, a warm compress can help relax tense muscles, especially in the neck and shoulders, which often become sources of stress and discomfort for those suffering from hypertension (Oktavia et al., 2024). This research shows that the application of warm compresses can reduce headache intensity, improve blood pressure control, and enhance therapeutic outcomes when combined with aromatherapy (Zakaria et al., 2024). Incorporating warm compress therapy into standard care offers several benefits, including a non-pharmacological option for patients who are sensitive to medications and a holistic approach to hypertension management.

The results of the bivariate test indicate that warm compress therapy has a significant effect on lowering blood pressure in hypertensive patients (p-value = 0.001). This is in line with research conducted by Sridani et al. (2021) that warm ginger compresses have a significant effect on reducing systolic and diastolic blood pressure in hypertensive patients. Warm compress therapy causes peripheral blood vessels to undergo vasodilation, diverting blood supply from internal organs. This increases blood flow and reduces peripheral vascular resistance, which in turn lowers blood pressure. This warm compress also helps relax the muscles and nerves, which reduces stimulation in the sympathetic nervous system. The sympathetic nervous system is responsible for increasing blood pressure through the release of stress hormones like adrenaline.

Implication and limitations

The study suggests that warm compress therapy can effectively reduce headaches and stabilize blood pressure in hypertensive patients, offering a cost-effective and accessible tool for hypertension management. This could improve patient comfort, reduce medication reliance, and enhance quality of life. The therapy could also be used to manage stress-related symptoms like muscle tension or anxiety, highlighting the potential for further research to validate and expand its therapeutic uses.

The study on warm compress therapy in hypertensive patients has several limitations, including a small sample size, unclear long-term effects on blood pressure and headache relief, lack of a control group, and insufficient exploration of individual differences in response to the therapy. Future research should include larger sample sizes, longer intervention durations, and a control group to better understand the specific benefits of warm compress therapy. The study serves as a foundation for future research, but more comprehensive investigations are needed to fully understand the mechanisms and long-term benefits of this treatment.

CONCLUSION

The study reveals that warm compress therapy significantly reduces headache intensity and lowers blood pressure in hypertensive patients. The therapy's effectiveness as a non-pharmacological intervention was confirmed, with a p-value of 0.000. It also significantly reduced blood pressure in hypertensive patients, indicating its potential as a complementary treatment for managing hypertension. The findings highlight the therapeutic value of warm compress therapy in alleviating discomfort and regulating blood pressure. As a simple, cost-

effective, and non-invasive intervention, it can be easily integrated into clinical practice to improve patient outcomes, especially in hypertensive patients with headaches.

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