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Blood pressure changes following combined instrumental music therapy and ginger decoction foot hydrotherapy among patients with hypertension

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Abstract

Background: Hypertension is a major global health problem that contributes to increased morbidity and mortality from cardiovascular disease. Blood pressure control can be supported by non-pharmacological approaches, including safe and easy-to-implement complementary therapies such as instrumental music therapy and ginger decoction hydrotherapy.

Purpose: To analyse the effectiveness of combined instrumental music therapy and ginger decoction hydrotherapy on blood pressure in patients with hypertension.

Method: A quantitative quasi-experimental study with a one-group pre-test and post-test design was conducted among patients with hypertension at Kedaton Community Health Center, Bandar Lampung. 15 patients were initially recruited using purposive sampling, and 15 respondents with complete intervention and pre-test and post-test data were included in the final analysis. The intervention combined slow-tempo instrumental music therapy and ginger decoction foot hydrotherapy for 15 minutes daily over five days. Blood pressure was measured before and after the intervention and analysed using the Wilcoxon signed-rank test at a significance level of $p < 0.05$.

Results: The mean age of the respondents was 54.80 years, and most were female. Before the intervention, the mean systolic and diastolic blood pressures were 156.00 mmHg and 98.67 mmHg, respectively. Following the combination of instrumental music therapy and ginger decoction hydrotherapy, the mean systolic blood pressure decreased to 138.67 mmHg, while the mean diastolic blood pressure decreased to 86.67 mmHg. The Wilcoxon signed-rank test showed a significant difference in both systolic and diastolic blood pressure before and after the intervention ($p < 0.001$).

Conclusion: The combination of instrumental music therapy and ginger decoction hydrotherapy was effective in reducing blood pressure among patients with hypertension. This combination may be considered a supportive non-pharmacological intervention in community nursing and primary healthcare settings. Further studies using a controlled experimental design and longer intervention duration are recommended to strengthen the evidence.

Keywords: Blood Pressure; Ginger Decoction Hydrotherapy; Hypertension; Instrumental Music Therapy; Non-Pharmacological Therapy.

INTRODUCTION

Hypertension is one of the most common non-communicable diseases and remains a major public health problem worldwide. Hypertension is characterized by persistently elevated blood pressure in the arteries and is commonly assessed based on systolic and diastolic blood pressure measurements. Systolic blood pressure represents the pressure in the

arteries when the heart contracts, whereas diastolic blood pressure represents the pressure when the heart relaxes between beats (Apriyani, Dewi, & Ludiana, 2025). Hypertension is often referred to as a *silent killer* because many individuals do not experience specific symptoms despite having elevated blood pressure for years. Symptoms such as

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headache, dizziness, and visual disturbances may occur, particularly when blood pressure is substantially elevated or complications have developed (Aulia, Inayati, & Immawati, 2025). According to the World Health Organization (WHO), an estimated 1.28 billion adults aged 30–79 years worldwide have hypertension, with most living in low- and middle-income countries. Approximately 46% of adults with hypertension are unaware of their condition, while only 42% are diagnosed and treated. Furthermore, only approximately 21% of adults with hypertension have their blood pressure adequately controlled. Hypertension is therefore one of the leading causes of premature death worldwide (World Health Organization, 2024). In Indonesia, the prevalence of hypertension among adults was 30.8% in 2023, representing a decrease from 34.1% in 2018. Despite this decline, hypertension remains a major health concern requiring continuous prevention and management.

Hypertension is also a significant health problem in Lampung Province. Data on hypertension services in Lampung Province in 2022 indicated that hypertension was among the leading diseases affecting the population, with an estimated 545.625 cases. Bandar Lampung recorded 11.378 cases and was among the areas with a substantial burden of hypertension. According to data from the Bandar Lampung Health Office in 2024, Kedaton Community Health Center was among the four community health centers with the highest number of patients estimated to have hypertension, with approximately 10.983 cases. Furthermore, a two-month presurvey conducted at Kedaton Community Health Center in 2025 showed that hypertension was among the three most common diseases, with 336 cases, comprising 108 male and 228 female patients. These data indicate that hypertension remains an important health problem in the Kedaton Community Health Center working area and requires effective and feasible interventions. The development of hypertension is influenced by modifiable and non-modifiable risk factors. Modifiable factors include excessive sodium intake, obesity, smoking, alcohol consumption, physical inactivity, stress, and unhealthy lifestyle patterns. Excessive sodium consumption can increase blood pressure through fluid retention and increased plasma volume. Alcohol consumption may also contribute to elevated blood

pressure. In addition, sleep patterns have been associated with hypertension, with abnormalities in sleep duration potentially affecting neuroendocrine regulation, cortisol levels, and systemic inflammation (Halim, 2025). Non-modifiable factors include age, sex, and family history of hypertension. Previous research has also demonstrated that socioeconomic factors, obesity, smoking, and low physical activity contribute to the development of hypertension among adults. Hypertension management generally involves pharmacological and non-pharmacological approaches. Pharmacological treatment includes antihypertensive medications such as angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, calcium channel blockers, beta-blockers, and diuretics. Non-pharmacological management includes lifestyle modification and complementary interventions. Complementary therapies that may support blood pressure control include music therapy, hydrotherapy, aromatherapy, and relaxation techniques. These approaches may be particularly useful in community healthcare settings because they can be relatively simple, accessible, and inexpensive (Ambanaga & Siokal, 2025).

Music therapy is a complementary intervention that uses music to support physical, emotional, cognitive, and social well-being. Music can promote relaxation, reduce muscle tension, and create a safe and pleasant environment. Physiologically, music may influence the limbic system and autonomic nervous system, potentially contributing to reductions in heart rate, pulse rate, and blood pressure through relaxation and modulation of stress responses. Instrumental music may therefore provide a simple non-pharmacological approach to support blood pressure management among patients with hypertension. Another complementary intervention is warm-water foot hydrotherapy combined with ginger decoction. Ginger contains volatile oils and oleoresin compounds, including gingerol, which contribute to its characteristic warmth and aroma. The warming effect of ginger may promote peripheral vasodilation and improve blood circulation, potentially supporting reductions in blood pressure. In practice, ginger decoction hydrotherapy can be administered by immersing the feet in warm ginger-infused water at an appropriate temperature. When combined with instrumental music therapy and deep-breathing relaxation, this intervention may provide a multimodal

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approach to reducing physiological and psychological factors associated with elevated blood pressure.

Previous studies have reported beneficial effects of complementary interventions on blood pressure. A combination of natural water music and lavender aromatherapy among patients with hypertension at Griya Asih Lawang demonstrated differences in blood pressure before and after the intervention (Kartikaningtias, Aini, & Da Costa, 2025). Before the intervention, most respondents had grade 1 hypertension (93.3%), while 6.7% had grade 2 hypertension. After the intervention, 83.3% of respondents were categorized as having normal blood pressure and 16.7% as having high-normal blood pressure. The combination of foot hydrotherapy and Benson relaxation among patients with hypertension reported a reduction in blood pressure after the intervention (Saputri, Pakarti, & Ayubbana, 2025). The intervention was administered once daily for three days, with each session lasting 20 minutes. The mean reduction in blood pressure was 11/6 mmHg in the first respondent and 11/7 mmHg in the second respondent. Although previous studies have demonstrated the potential benefits of music-based therapy and hydrotherapy for blood pressure reduction, evidence regarding the effectiveness of combining instrumental music therapy with ginger decoction hydrotherapy remains limited, particularly in community healthcare settings. A combination of these interventions may provide an accessible, low-cost, and non-pharmacological option for supporting blood pressure control among patients with hypertension.

RESEARCH METHOD

This study employed a quantitative quasi-experimental design using a one-group pre-test and

post-test approach. The study was conducted among patients with hypertension at Kedaton Community Health Center, Bandar Lampung, from January 12 to 25, 2026. A total of 50 patients were initially recruited through purposive sampling based on predetermined inclusion and exclusion criteria. However, only 15 respondents completed the entire intervention protocol and had complete pre-test and post-test data; therefore, 15 respondents were included in the final analysis. The reduction from 50 initially recruited patients to 15 analyzed respondents occurred because 35 patients were excluded due to incomplete data, failure to complete the intervention protocol, or withdrawal from the study. The combined intervention was administered once daily for five days, beginning at 09:00 WIB, for 15 minutes per session. Instrumental music therapy used slow-tempo instrumental music averaging 55 beats per minute, while ginger decoction hydrotherapy involved immersing both feet up to the ankles in warm water maintained at 37–40°C for approximately 15 minutes. Blood pressure was measured using a sphygmomanometer and stethoscope before and after the intervention, with two measurements taken at each time point and recorded on an observation sheet.

Data were analyzed using univariate analysis to describe respondent characteristics and blood pressure values before and after the intervention. Normality was assessed using the Shapiro–Wilk test. Bivariate analysis was performed using the Wilcoxon signed-rank test because the data did not meet the normality assumption. Statistical significance was set at $p < 0.05$. This study received ethical approval from Universitas Mitra Indonesia under ethical approval number S.25/193/FKES10/2026.

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RESEARCH RESULTS

Table 1. Characteristics of Respondents (N = 15)

Variable	Results
Age (Mean±SD)(Range)(Year)	(54.80±11.169)(34-73)
Gender (n/%)	
Male	7/46.7
Female	8/53.3
Education (n/%)	
Elementary School	3/20.0
Junior High School	2/13.3
Senior High School	4/26.7
University	6/40.0

The respondents had a mean age of 54.80 ± 11.169 years, with ages ranging from 34 to 73 years. Most respondents were female (8; 53.3%), while 7 (46.7%) were male. Regarding educational level, the majority had graduated from university (6; 40.0%), followed by senior high school (4; 26.7%), elementary school (3; 20.0%), and junior high school (2; 13.3%).

Table 2. Blood Pressure Before and After Intervention

Variable	Mean	SD	Min-Max	95%CL	P-Value
Before					
Systolic blood pressure (mmHg)	156.00	17.647	140-200	146.23-165.77	0.017
Diastolic blood pressure (mmHg)	98.67	6.399	90-110	95.12-102.21	0.003
After					
Systolic blood pressure (mmHg)	138.67	17.265	120-180	129.11-148.23	0.044
Diastolic blood pressure (mmHg)	86.67	7.237	80-100	82.66-90.67	0.002

The table presents the mean, standard deviation (SD), minimum–maximum values, 95% confidence limits (95% CL), and *p*-values of systolic and diastolic blood pressure before and after the intervention. Before the intervention, the mean systolic blood pressure was 156.00 ± 17.647 mmHg, while the mean diastolic blood pressure was 98.67 ± 6.399 mmHg. After the intervention, the mean systolic blood pressure decreased to 138.67 ± 17.265 mmHg, and the mean diastolic blood pressure decreased to 86.67 ± 7.237 mmHg. The normality test showed *p*-values < 0.05 for all variables, indicating that the blood pressure data were not normally distributed. Therefore, the Wilcoxon signed-rank test was used for further analysis.

Table 3. Effect of Combined Therapy on Blood Pressure

Variable	Mean Difference	Negative Ranks (n)	Positive Ranks (n)	Ties (n)	Z	P-Value
Systolic (Pre-Post)	17.333	0	15	0	-3.578	<0.001
Diastolic (Pre-Post)	12.000	0	15	0	-3.626	<0.001

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The mean difference in systolic blood pressure was 17.333 mmHg, while the mean difference in diastolic blood pressure was 12.000 mmHg. All 15 respondents showed a decrease in both systolic and diastolic blood pressure, as indicated by 0 negative ranks, 15 positive ranks, and 0 ties. The Wilcoxon signed-rank test showed a statistically significant difference in systolic blood pressure ($Z = -3.578$, $p < 0.001$) and diastolic blood pressure ($Z = -3.626$, $p < 0.001$) before and after the intervention. These findings indicate a significant reduction in blood pressure following the combined intervention.

DISCUSSION

The univariate analysis showed that the mean systolic blood pressure before the intervention was 156.00 ± 17.647 mmHg, with a minimum value of 140 mmHg and a maximum value of 200 mmHg. The 95% confidence interval ranged from 146.23 to 165.77 mmHg. The mean diastolic blood pressure was 98.67 ± 6.399 mmHg, with a minimum value of 90 mmHg and a maximum value of 110 mmHg. The 95% confidence interval ranged from 95.12 to 102.21 mmHg. These findings indicate that the respondents had elevated blood pressure before receiving the intervention. According to the European Society of Cardiology/European Society of Hypertension (ESC/ESH) guidelines, hypertension is characterized by systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg. Systolic blood pressure of 140–159 mmHg is classified as grade 1 hypertension, while 160–179 mmHg is classified as grade 2 hypertension. Diastolic blood pressure of 90–99 mmHg is classified as grade 1 hypertension. The relatively high baseline blood pressure observed in this study may be associated with physiological and vascular changes that occur with increasing age. Increased arterial stiffness and reduced vascular elasticity can contribute to increased systolic blood pressure and pulse pressure, particularly among older adults (Fares & Soliman, 2022).

These findings are consistent with previous studies reporting elevated blood pressure among patients with hypertension before receiving complementary or non-pharmacological interventions. Elevated blood pressure among patients with hypertension before complementary therapy (Handa, Ariski, Nasution, Nursafira, Triyani,

Herlinawati, & Safrudin, 2025). Similarly, studies investigating warm-water foot soak therapy combined with ginger or red ginger have examined its application as a complementary intervention for patients with hypertension (Muda, Liyanti, & Sukmana, 2023; Pangesti, Mulyaningrat, & Sumeru, 2025; Sari & Sari, 2023). These findings provide a relevant basis for evaluating changes in blood pressure following complementary interventions in patients with hypertension.

The elevated baseline blood pressure in the present study reflects the initial cardiovascular condition of the respondents before intervention. Several factors may contribute to elevated blood pressure, including age, lifestyle, stress, physical activity, dietary patterns, and vascular changes associated with aging. The relatively high baseline values also provide an appropriate basis for evaluating changes in blood pressure following the combined intervention. The univariate analysis demonstrated a reduction in blood pressure following the intervention. The mean systolic blood pressure decreased from 156.00 ± 17.647 mmHg before the intervention to 138.67 ± 17.265 mmHg after the intervention. The post-intervention systolic blood pressure ranged from 120 to 180 mmHg, with a 95% confidence interval of 129.11–148.23 mmHg. The mean diastolic blood pressure decreased from 98.67 ± 6.399 mmHg to 86.67 ± 7.237 mmHg. The post-intervention diastolic blood pressure ranged from 80 to 100 mmHg, with a 95% confidence interval of 82.66–90.67 mmHg. Thus, the mean systolic blood pressure decreased by 17.33 mmHg, while the mean diastolic blood pressure decreased by 12.00 mmHg. The lower post-intervention confidence intervals compared with the pre-intervention values further demonstrate a descriptive reduction in blood pressure following the combined instrumental music therapy and ginger decoction hydrotherapy.

The reduction in blood pressure may be explained by the complementary effects of relaxation and warm-water hydrotherapy. Music therapy can promote relaxation and reduce psychological stress, which may influence autonomic nervous system activity and cardiovascular responses. Meanwhile, warm-water hydrotherapy may promote peripheral circulation and relaxation, potentially contributing to reduced vascular resistance (Febriana, 2025). Ginger contains

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bioactive compounds, including gingerols and shogaols, which have been investigated for their potential vascular and anti-inflammatory effects. Previous studies have examined warm-water foot soak therapy with red ginger among patients with hypertension and reported its use as a complementary approach to blood pressure management (Muda et al., 2023; Salis, Taufik, Iskandar, & Alivian, 2024; Sari & Sari, 2023). Other studies have also investigated ginger-based warm-water foot soak formulations, including combinations with lemongrass, in relation to blood pressure reduction (Suidah, Santoso, Widjati, & Bahnonik, 2025). These findings support the relevance of ginger-based foot hydrotherapy as a complementary component of the intervention used in the present study.

The findings are also consistent with previous research on complementary foot-soak interventions for hypertension. Investigated warm-water foot soak therapy with red ginger combined with Benson therapy among hypertensive older adults (Pangesti et al., 2025). Examined complementary foot soak therapy using red ginger boiled water in older adults (Salis et al., 2024). Investigated warm ginger water foot baths in relation to blood pressure reduction among hypertensive older adults (Sari & Sari, 2023). The use of warm-water foot soaking with red ginger as a non-pharmacological intervention in nursing care for hypertension (Eviriana, Nito, & Tjomiadi, 2026). Although these studies used different intervention protocols and research designs, their focus on ginger-based warm-water foot therapy is relevant to the hydrotherapy component of the present study. Other complementary foot-soak approaches, including warm-water foot soaking combined with lemon aromatherapy, have also been investigated in relation to blood pressure among older adults with hypertension (Triana, Alivian, & Kusumawardani, 2025). Similarly examined warm foot soaking with a mixture of complementary ingredients as part of non-pharmacological approaches for patients with hypertension (Amirah, Iskandar, & Pratama, 2023).

The Wilcoxon signed-rank test demonstrated a significant difference in both systolic and diastolic blood pressure before and after the intervention. The mean reduction was 17.333 mmHg for systolic blood pressure and 12.000 mmHg for diastolic blood pressure. All 15 respondents experienced a decrease

in both systolic and diastolic blood pressure, with 15 positive ranks and no negative ranks or ties. The Z value was -3.578 for systolic blood pressure and -3.626 for diastolic blood pressure, with both analyses yielding $p < 0.001$. Therefore, there was a statistically significant difference in systolic and diastolic blood pressure following the combination of instrumental music therapy and ginger decoction hydrotherapy. The effectiveness of the intervention may be associated with the complementary mechanisms of the two therapies. Instrumental music therapy may facilitate relaxation by reducing psychological tension and modulating autonomic nervous system activity. Relaxation can reduce sympathetic activation and promote parasympathetic activity, which may subsequently influence heart rate and vascular tone (Usman, Pomalang, Yusuf, & Djamaluddin, 2025). Ginger decoction hydrotherapy, on the other hand, combines the potential warming effects of hydrotherapy with the bioactive properties of ginger. Warm water may promote peripheral vasodilation and improve local circulation, while ginger contains compounds that have been investigated for potential vascular effects (Nugroho, Ulfah, & Kurniawan, 2025).

The combination of these interventions may therefore provide complementary effects on both psychological and physiological pathways associated with blood pressure regulation. Music therapy primarily provides a relaxation response, whereas ginger decoction hydrotherapy provides a warming and circulatory stimulus. However, because this study used a one-group pre-test and post-test design without a control group, the observed reduction cannot be attributed exclusively to the combination of interventions. Other factors, including medication use, rest, dietary intake, physical activity, stress, and natural variation in blood pressure, may also have contributed to the observed changes. Furthermore, the previous studies on ginger-based foot hydrotherapy generally examined foot soaking or ginger-based interventions separately from instrumental music therapy (Muda et al., 2023; Salis et al., 2024; Sari & Sari, 2023). Therefore, the present findings should be interpreted as preliminary evidence regarding the application of a combined intervention rather than evidence of an independent synergistic effect.

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The findings are in line with previous studies reporting the potential benefits of complementary interventions, including music-based relaxation and ginger-based foot hydrotherapy, for blood pressure management. The present study provides additional evidence regarding the application of combined instrumental music therapy and ginger decoction hydrotherapy in a primary healthcare setting. The intervention is relatively simple and may be feasible as a supportive nursing intervention when implemented alongside standard medical management. From a nursing perspective, the combination of instrumental music therapy and ginger decoction hydrotherapy may be considered a complementary non-pharmacological intervention to support blood pressure management among patients with hypertension. Its implementation may also contribute to a more holistic approach by addressing both physiological and psychological aspects of patient care. Nevertheless, further studies with randomized controlled designs, larger samples, longer follow-up periods, and appropriate control groups are needed to establish the independent and combined effects of these interventions more conclusively.

CONCLUSION

The combination of instrumental music therapy and ginger decoction hydrotherapy was associated with a significant reduction in blood pressure among patients with hypertension. The mean systolic blood pressure decreased from 156.00 mmHg before the intervention to 138.67 mmHg after the intervention, while the mean diastolic blood pressure decreased from 98.67 mmHg to 86.67 mmHg. The Wilcoxon signed-rank test showed a significant difference in both systolic and diastolic blood pressure before and after the intervention ($p < 0.001$). These findings suggest that the combination of instrumental music therapy and ginger decoction hydrotherapy may be used as a complementary non-pharmacological intervention to support blood pressure management among patients with hypertension in primary healthcare settings. Further research using a controlled experimental design is recommended to confirm the effectiveness of this combined intervention.

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