PROFESIONAL HEALTH JOURNAL
Volume 7, No. 2, June (Page. 538-546)
Available Online at https://www.ojsstikesbanyuwangi.com/index.php/PHJ/index
E-ISSN 2715-6249
DOI: https://doi.org/10.54832/phj.v7i2.1212

The Effect of Slow Stroke Back Massage on Headache Intensity in Hypertensive Older Adults

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ARTICLE INFORMATION

Article history
Received (20 May 2025)
Revised (9 June 2025)
Accepted (12 June 2025)

Keywords
Headache; Hypertension; Slow Stroke Back Massage; Elderly; Complementary Therapy

ABSTRACT

Introduction: *A Headache is a common complaint among individuals with hypertension and is often associated with elevated blood pressure. One form of complementary therapy that can be applied to alleviate this symptom is Slow Stroke Back Massage (SSBM).*
Objectives: *This study aimed to examine the effect of Slow Stroke Back Massage on headache intensity in older adults with hypertension.*
Methods: *This research is a quantitative study with a quasi-experimental design. The approach used was pretest-posttest with a non-equivalent control group. The sample consisted of 34 hypertensive elderly people selected by purposive sampling according to the inclusion and exclusion criteria. Determination of the number of samples using the two-average formula (unpaired two-group difference test). A minimum number of 16 respondents per group was obtained. To anticipate drop out, the number of samples was increased by 10%, bringing the total to 34 respondents. The intervention group received SSBM therapy for 10 minutes, three times a week for four weeks. The control group only received standard antihypertensive drugs, and headache intensity was measured by Numeric Rating Scale (NRS) before and after the intervention.*
Results: *The mean pre-test headache intensity score was 6.12 ± 1.62 in the intervention group and 5.82 ± 1.55 in the control group. After the intervention, the mean scores decreased to 2.71 ± 1.53 and 3.82 ± 1.55, respectively. The reduction in headache intensity was 3.41 points in the intervention group and 2.00 points in the control group. The Wilcoxon test showed a significant difference in the intervention group ($p = 0.000$), while the paired sample t-test confirmed significance in the control group ($p = 0.000$). The pre-test comparison between groups using the independent t-test indicated no significant difference ($p = 0.592$), whereas the post-test comparison using the Mann-Whitney U test showed a significant difference ($p = 0.041$). These findings suggest that SSBM significantly reduces headache intensity among hypertensive older adults.*
Conclusions: *Slow Stroke Back Massage is an effective, safe, and non-pharmacological intervention for reducing headache intensity in hypertensive patients. Its application is recommended as a complementary therapy in elderly care.*

Introduction

Globalization and rapid advancements in technology and industry have significantly influenced human behavior, lifestyle, and environmental conditions. These changes have led to unhealthy lifestyle habits such as the frequent consumption of fast food, processed meals high in fat and calories, physical inactivity, smoking, and alcohol use. These behavioral patterns have contributed to an epidemiological transition marked by a growing prevalence of non-communicable diseases (NCDs), particularly degenerative conditions that now serve as leading causes of morbidity and mortality worldwide (Rahajeng & Tuminah, 2009). Among the most pressing NCDs is hypertension, often referred to as the "silent killer." Although incurable,

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hypertension is a chronic health condition that can be managed through healthy lifestyle practices (Pujiastuti et al., 2022). Uncontrolled hypertension significantly increases the risk of serious cardiovascular events, including a sevenfold risk of stroke, sixfold risk of congestive heart failure, and threefold risk of myocardial infarction (Yonata & Pratama, 2016). According to the World Health Organization (WHO) and the International Society of Hypertension (ISH), approximately 600 million people globally are affected by hypertension, with an estimated 3 million deaths annually. Alarmingly, seven out of ten people with hypertension do not receive adequate treatment (Sukmadi et al, 2021).

Hypertension or high blood pressure is one of the main health problems in Indonesia and is often found in older age groups. Based on the 2018 National Riskesdas data, the prevalence of hypertension based on measurement results in the population aged ≥18 years in Indonesia shows that Bali Province ranks 14th with a prevalence of 29.97%, while nationally, South Kalimantan is recorded as the province with the highest prevalence of 44.13%, and Papua Province as the lowest with 22.22% (Indonesia, 2019). In Bali Province, Badung Regency has a prevalence of hypertension of 29.33% and is ranked 6th out of nine districts / cities (Badung Regency Health Office, 2021). The number of people with hypertension who received health services in Badung Regency was recorded at 7,835 people (81.5%) of the estimated number of sufferers of 9,611 people. Hypertension in the elderly is often accompanied by complaints of headache due to uncontrolled increases in blood pressure. (Dinas Kesehatan Kabupaten Badung, 2021).

Hypertension is one of the most frequently encountered conditions in primary care. According to WHO, it is defined as a persistent elevation in systolic blood pressure (≥140 mmHg) or diastolic blood pressure (≥90 mmHg) (Istyawati et al., 2020). Headache is a commonly reported symptom among hypertensive patients and is typically associated with increased intracranial pressure (Mahfuzah et al., 2023). In older adults, headaches can severely impact daily functioning, lower quality of life, and increase healthcare costs (WHO, 2018). Physiologically, headache in hypertensive patients may result from restricted venous return and arterial blood flow, leading to oxygen deprivation and increased carbon dioxide, which triggers anaerobic metabolism and lactate accumulation—ultimately stimulating pain receptors in the brain (Putra, 2017). In the United States, 40% of hypertensive patients report headaches, 28.5% experience palpitations, 20.8% dizziness, and 13.8% tinnitus (Yanti et al., 2019). A survey by Khusna et al. (2022) found that occipital headache is the most common type experienced by hypertensive patients in Yogyakarta. Similarly, Ramadhani et al. (2022) observed that 28 out of 35 hypertensive patients reported moderate headache intensity.

To mitigate hypertension risks, the Indonesian government promotes the CERDIK health campaign (regular health checks, smoking cessation, physical activity, balanced diet, adequate rest, and stress management) through programs such as the *Posbindu PTM* in community health centers (Suarjaya, 2018). Bali's provincial government—under the "Nangun Sat Kerthi Loka Bali" vision—also issued Governor Regulation No. 55 of 2019, which formalized traditional and complementary health services. These services are offered through independent practitioners, health homes (*griya sehat*), and healthcare facilities. One recognized practice is the Latu Usadha Independent Nursing Clinic, which offers holistic, complementary care with ethical and legal authorization.

Hypertension can be managed through pharmacological and non-pharmacological approaches (Sardaniah et al., 2020). Pharmacological treatments include the use of diuretics, beta-blockers, and angiotensin-converting enzyme inhibitors (Kandarini, 2017), while non-pharmacological strategies involve herbal medicine, lifestyle modifications, dietary compliance, and relaxation techniques (Iqbal & Handayani, 2022). Hartanti (2016) emphasized incorporating relaxation therapy into hypertension management. One such method, Slow Stroke Back Massage (SSBM), is effective, safe, and accessible for hypertensive patients (Meidayanti et al., 2023). This

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technique is easy to administer, affordable, and can be taught to family members without formal training (L. Ode, 2017). In Indonesia, complementary therapies such as SSBM are recognized under the Ministry of Health Regulation No. HK.02.02/MENKES/148/2010, which authorizes nurses to provide such services as part of integrated healthcare (Adeniran et al., 2010). SSBM involves gentle strokes along the back that stimulate endorphin release, induce relaxation, and reduce blood pressure (Hidayah & Nisak, 2018). Typically performed over 3–10 minutes, this technique calms muscles, tendons, and ligaments while modulating autonomic nervous system activity—decreasing sympathetic and increasing parasympathetic responses to achieve vasodilation and pain relief (Punjastuti & Fatimah, 2020).

Research by (Meidayanti et al., 2023), shows that slow stroke back massage effectively reduces blood pressure in elderly hypertension by reducing systolic and diastolic blood pressure in the intervention group by 21.04 mmHg and 11.68 mmHg respectively with a significance value of $p < 0.05$, while the control group did not show a significant decrease. Similar research conducted by (Marlinda et al., 2023) discussed the effect of slow stroke back massage technique on blood pressure in hypertensive patients. The results showed that this technique was effective in reducing blood pressure in elderly people with hypertension. The average blood pressure before the intervention was 152.50 mmHg (systolic) and 92.50 mmHg (diastolic). After the intervention, blood pressure decreased to 126.25 mmHg (systolic) and 76.25 mmHg (diastolic). The paired t-test results showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect. Therefore, this technique is recommended to be applied as a supporting therapy at Hiang Health Center in the management of elderly hypertension.

Methods

This study employed a quasi-experimental design with a pretest-posttest non-equivalent control group approach. The research was conducted at the Latu Usadha Independent Nursing Practice from April 1 to May 1, 2023. The sampling technique applied was purposive sampling, which is appropriate for targeting specific characteristics relevant to the study objective (Subhaktiyasa, 2024b). The study population consisted of 112 older adults diagnosed with hypertension. A total of 34 participants were selected based on inclusion and exclusion criteria, and evenly assigned into two groups: 17 participants in the intervention group and 17 in the control group.

Inclusion criteria comprised: (1) diagnosed hypertension, (2) aged 60–79 years, (3) currently using antihypertensive medication, and (4) willingness to participate voluntarily. Exclusion criteria included: burns, bruises, rashes, skin inflammation on the back, or spinal fractures. Data collection procedures included both administrative and technical steps. The primary instrument used to measure headache intensity was the Numeric Rating Scale (NRS), a widely accepted pain assessment tool with proven validity and reliability in clinical and research settings (Khusna et al., 2022)(Subhaktiyasa, 2024a).

Before the intervention, both groups completed a pre-test to assess headache intensity using the NRS. The intervention group received Slow Stroke Back Massage (SSBM) therapy for four weeks, with three sessions per week, totaling twelve 10-minute sessions. The control group received only standard antihypertensive treatment without additional intervention. After the final session, both groups completed a post-test to reassess headache intensity using the same instrument.

Data analysis was conducted using SPSS. Descriptive and inferential statistics were employed to examine changes in headache intensity and test significance between and within groups (Subhaktiyasaa et al., 2025). The Shapiro-Wilk test was used to assess data normality. Data were not normally distributed within the intervention group; thus, they were analyzed using the Wilcoxon signed-rank test. In contrast, the control group showed normal distribution and was

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analyzed using the paired sample t-test. The independent t-test was applied at the pre-test stage for between-group comparisons, while the Mann-Whitney U test was used for post-test comparisons due to non-normal distribution. A significance threshold of $p < 0.05$ was adopted for all analyses.

Results

This study involved 34 respondents, divided equally between the intervention and control groups, with 17 participants in each. Table 1 presents the demographic characteristics of the respondents.

Table 1. Distribution of Respondents by Demographic Characteristics

Characteristics	Category	Intervention Group (n=17)		Control Group (n=17)	
		n	%	n	%
Gender	Male	8	47.1	7	41.2
	Female	9	52.9	10	58.8
Educational Level	Elementary School	4	23.5	3	17.6
	Junior High School	8	47.1	9	52.9
	Senior High School	4	23.5	4	23.5
	Higher Education	1	5.9	1	5.9
Employment Status	Unemployed / Housewife	4	23.5	3	17.6
	Private Sector	2	11.8	2	11.8
	Entrepreneur	6	35.3	8	47.1
	Farmer	4	23.5	3	17.6
	Retired	1	5.9	1	5.9
Duration of Hypertension	1–5 years	10	58.8	10	58.8
	6–10 years	7	41.2	7	41.2

Table 1 shows that most participants in both groups were female, with 52.9% in the intervention group and 58.8% in the control group. Most respondents had completed junior high school, accounting for 47.1% in the intervention group and 52.9% in the control group. Regarding employment status, the highest proportion in both groups was entrepreneurs, with 35.3% in the intervention group and 47.1% in the control group. Additionally, 58.8% of participants in both groups had been living with hypertension for 1–5 years. Table 2 compares headache intensity scores within and between the intervention and control groups before and after the intervention.

Table 2. Comparison of Headache Intensity in Hypertensive Older Adults

Variable	n	Intervention Group (Mean ± SD)	Control Group (Mean ± SD)	*p* Value
Pre-test Headache Intensity	17	6.12 ± 1.62	5.82 ± 1.55	0.592
Post-test Headache Intensity	17	2.71 ± 1.53	3.82 ± 1.55	0.041
Within-group p-value		0.000	0.000	

Table 2 shows that the pre-test comparison revealed no significant difference in headache intensity between the two groups ($p = 0.592$), indicating a comparable baseline. However, after the intervention, the mean headache intensity significantly decreased in both groups. The intervention group showed a greater reduction (from 6.12 to 2.71) than the control group (from 5.82 to 3.82). The between-group comparison at post-test indicated a statistically significant difference ($p = 0.041$), suggesting that Slow Stroke Back Massage effectively reduced headache intensity in hypertensive older adults. The within-group analysis also showed statistically

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significant reductions in both the intervention and control groups (p = 0.000), although the magnitude of change was greater in the intervention group.

Discussion

Pre-Test Headache Intensity in the Intervention and Control Groups

The pre-test results revealed that the mean headache intensity in the intervention group was 6.12 ± 1.62, while in the control group it was 5.82 ± 1.55. These findings are consistent with the study by Istyawati et al. (2020), who reported a pre-intervention pain score of 5.83, and Hidayat (2023), who found a score of 5.00 before the SSBM intervention. Pain is inherently subjective and varies in intensity from mild to severe depending on individual perception (Junaedi et al., 2013). While the numerical differences across studies may vary, the pain intensities reported remain within the moderate category. Differences may stem from demographic factors such as age and gender. Junaedi et al. (2013) identified gender as one of the variables influencing hypertension. In this study, most respondents in both groups were female, a finding aligned with Warjiman et al. (2020), who reported that women are more prone to elevated blood pressure post-menopause due to decreased estrogen levels. Estrogen is key in maintaining vascular health by increasing high-density lipoprotein (HDL) levels. Mayer (2018) explained that headache in hypertensive patients may result from increased arterial pressure due to peripheral resistance and cardiac output, which disrupts blood flow and reduces oxygenation, leading to vascular spasms and pain. Therefore, both groups' high baseline headache intensity reflects the lack of intervention and ongoing physiological strain.

Post-Test Headache Intensity in the Intervention and Control Groups

Post-intervention analysis showed a significant reduction in headache intensity. The intervention group reported a mean score of 2.71 ± 1.53, while the control group reported 3.82 ± 1.55. This result is consistent with findings from Surya and Yusri (2022), who documented a post-intervention score of 2.24. Similarly, Sormin et al. (2022) found that SSBM reduced pain scores to 4 and 3 in two hypertensive patients. The observed reduction is consistent with the gate control theory, which suggests that gentle cutaneous stimulation activates A-beta sensory fibers that inhibit the transmission of pain signals, thereby lowering perceived pain (Surya & Yusri, 2022). SSBM is a recognized non-pharmacological intervention in hypertension management. While it does not replace pharmacological therapy, it supports overall treatment by reducing symptoms like headaches. Non-pharmacological therapies contribute to relaxation, lower sodium levels, stabilize blood pressure, and improve overall well-being (Purqoti et al., 2021). The significant decline in headache intensity in the intervention group is likely due to adherence to a standard SSBM protocol, involving stroking, petrissage, and friction techniques—all of which improve circulation and induce relaxation. In contrast, the control group only received antihypertensive medication, resulting in a less marked reduction in headache symptoms.

The Effect of Slow Stroke Back Massage on Headache Intensity Among Hypertensive Older Adults

Between-group comparisons showed that the mean headache intensity in the control group decreased from 5.82 ± 1.55 to 3.82 ± 1.55 (a reduction of 2 points), with a statistically significant p-value of 0.000. The intervention group experienced a greater reduction, from 6.12 ± 1.62 to 2.71 ± 1.53 (a 3.41-point decrease), with a p-value of 0.000. These results suggest that SSBM significantly reduces headache intensity among hypertensive older adults. The findings are consistent with studies by Wowor et al. (2022) and Pangastuti et al. (2022), which also reported reductions in blood pressure following SSBM interventions. Hidayat (2023) observed reductions

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in systolic and diastolic pressure (30.80 mmHg and 12.5 mmHg, respectively) and a 2.34-point reduction in headache intensity.

Headaches in hypertensive patients are commonly caused by vascular changes, including narrowing of arterioles, which impairs blood flow and leads to hypoxia. The resulting oxygen deficit and carbon dioxide buildup trigger anaerobic metabolism, increasing lactic acid and stimulating nociceptors in the brain (Nugroho et al., 2022). While both the intervention and control groups experienced reduced headache intensity, the greater reduction in the intervention group suggests an additive benefit of SSBM beyond standard medication. It further implies that SSBM enhances the effectiveness of antihypertensive therapy in alleviating headache symptoms.

The pre-test comparison between groups yielded a p-value of 0.592, indicating no significant difference and thus ensuring baseline equivalence. The post-test comparison, however, revealed a significant difference ($p = 0.041$), with the intervention group experiencing a greater reduction (3.41 vs. 2.00). These findings support the effectiveness of SSBM as a complementary intervention in hypertension care. Nurlathifah et al. (2022) also reported faster reductions in blood pressure and headache among patients receiving antihypertensive medication and SSBM.

Komang et al. (2021) found similar results using the Mann-Whitney U Test, reporting a p-value of 0.002, which confirmed a significant difference in post-test headache scores. Kristiana and Sari (2016) explained that SSBM stimulates sensory receptors in the skin, triggering the release of endorphins through the periaqueductal gray area and hypothalamus, ultimately inducing relaxation and pain relief. Sepdianto et al. (2022) further demonstrated that five 20-minute SSBM sessions reduced systolic and diastolic pressures by 13.88 mmHg and 10.08 mmHg, respectively. Meidayanti et al. (2023) found that 12 sessions of SSBM (10 minutes each, three times weekly for four weeks) reduced systolic pressure by 21.04 mmHg and diastolic pressure by 11.68 mmHg. Although minor reductions were also seen in the control group (3 mmHg systolic and diastolic), the intervention group showed a substantially greater improvement. The researchers conclude that SSBM effectively stimulates the release of endorphins, enhances blood flow, and induces a state of relaxation that leads to reduced blood pressure and headache intensity. Therefore, SSBM is highly recommended as a complementary therapy for managing hypertension in older adults, contributing to both physiological and psychological well-being.

Conclusion

This study demonstrates that Slow Stroke Back Massage (SSBM) is an effective complementary intervention for reducing headache intensity among older adults with hypertension. The intervention group experienced a greater decrease in pain scores than the control group, with statistically significant differences observed within and between groups. These findings directly address the study's objective and underscore the clinical relevance of non-pharmacological therapies in enhancing patient outcomes. SSBM offers a safe, simple, and non-invasive strategy that can be incorporated into nursing practice to improve symptom management and overall quality of life in hypertensive elderly populations. This intervention can enhance holistic nursing care while contributing to evidence-based clinical guidelines in geriatric and community health nursing.

Despite its promising results, this study acknowledges several limitations. The relatively small sample size and single-site design may limit the generalizability of the findings. Additionally, the short intervention duration may not capture the long-term effects of SSBM on blood pressure or broader physiological outcomes. Future research should consider multi-center trials with larger and more diverse samples, extended follow-up periods, and a broader range of clinical indicators. Further investigation into integrating SSBM with other complementary therapies may enrich its application. These efforts will strengthen the evidence base for

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implementing non-pharmacological interventions in nursing education, clinical care, and health system development locally and in broader regional or global contexts.

Ethics approval and consent to participate

This study was conducted under the ethical principles outlined and adhered to relevant national regulations for research involving human subjects. Ethical approval was obtained from the Health Research Ethics Committee (Komisi Etik Penelitian Kesehatan, KEPK) of STIKES Wira Medika Bali, Indonesia, as indicated by the Ethical Clearance Certificate No. 113/E1.STIKESWIKA/EC/IV/2023. Prior to participation, all respondents were provided with detailed information about the study's purpose, procedures, potential risks, and benefits. Participation was entirely voluntary, and written informed consent was obtained from each participant. The researchers ensured complete confidentiality and anonymity of all participant data throughout the research process. No identifying information was collected or published. As the study involved older adults with hypertension, researchers exercised additional care in the consent process to ensure comprehension and voluntary agreement. This study did not involve clinical trials or require registration in a public trial registry.

Acknowledgments

The authors sincerely thank STIKES Wira Medika Bali and the Latu Usadha Independent Nursing Practice for their institutional and operational support during the research process. Special thanks are extended to the nursing staff and older adult participants who contributed valuable data to this study.

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Volume 7, No. 2, June (Page. 538-546)
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