

Implementation of Combined Slow Stroke Back Massage and Slow Deep Breathing Exercise in a Patient with Ischemic Stroke and Hypertension: A Case Report

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Abstract

Ischemic stroke is commonly associated with hypertension, which may contribute to impaired cerebral perfusion and increased risk of complications. Non-pharmacological nursing interventions based on relaxation techniques may provide complementary support for blood pressure management; however, evidence regarding the combined application of Slow Stroke Back Massage and Slow Deep Breathing Exercise in acute stroke settings remains limited. This case study aimed to describe the implementation and observed changes in blood pressure following the application of combined Slow Stroke Back Massage and Slow Deep Breathing Exercise in a patient with ischemic stroke and hypertension. A case study was conducted in the Emergency Department of Bethesda Hospital Yogyakarta. One patient with ischemic stroke and elevated blood pressure received the combined intervention, and changes in vital signs were monitored before and after the intervention. Before the intervention, the patient's blood pressure was 195/106 mmHg with a mean arterial pressure of 136 mmHg. Post-intervention observations showed fluctuations in blood pressure, with measurements of 207/100 mmHg, 206/108 mmHg, and 187/103 mmHg, respectively. The final assessment demonstrated a reduction in systolic blood pressure accompanied by a decrease in pulse rate, while other vital signs remained stable. The application of combined Slow Stroke Back Massage and Slow Deep Breathing Exercise was accompanied by observed changes in blood pressure in this patient with ischemic stroke and hypertension. Further studies with larger samples and controlled designs are required to evaluate its clinical effectiveness.

Keywords: *Ischemic Stroke, Hypertension, Nursing Intervention, Slow Stroke Back Massage, Slow Deep Breathing Exercise*



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1. Introduction

Stroke is a neurological emergency caused by a sudden disruption of cerebral blood flow, either due to vascular occlusion or intracranial hemorrhage, which can result in neurological deficits and long-term disability. Globally, stroke remains one of the leading causes of mortality and disability, with a disproportionately high burden observed in low- and middle-income countries (Saini et al., 2021; Feigin & Owolabi, 2023).

Ischemic stroke represents the most prevalent type of stroke. Worldwide, approximately 87% of stroke cases in the 2016 estimates and approximately 70–85% of all stroke events are classified as ischemic stroke, resulting from a critical reduction in cerebral blood flow following arterial occlusion (Saini et al., 2021; Gąsecki et al., 2020).

Following arterial occlusion, neuronal death may occur within minutes in the ischemic core, whereas the surrounding tissue (ischemic penumbra) remains potentially salvageable if reperfusion is achieved promptly. Therefore, the acute phase of ischemic stroke requires rapid assessment and immediate management, including reperfusion strategies and stroke unit care, to reduce morbidity, mortality, and secondary complications (Wajngarten & Silva, 2019; Herpich & Rincon, 2020).

Hypertension is one of the most important and modifiable risk factors for stroke. Recent evidence indicates that hypertension contributes to more than 50% of ischemic stroke cases, and many acute ischemic stroke events represent the consequence of vascular pathology associated with chronic hypertension (Webb & Werring, 2022; Gąsecki et al., 2020).

Elevated blood pressure is also frequently observed during the hours to days following the onset of acute ischemic stroke. This phenomenon is clinically relevant because blood pressure plays a critical role in vascular function and organ perfusion, while the ischemic penumbra is highly vulnerable to fluctuations in cerebral blood flow influenced by systemic blood pressure levels (Gąsecki et al., 2020).

However, blood pressure management in acute ischemic stroke remains complex. An excessively rapid reduction in blood pressure may compromise perfusion to potentially viable brain tissue, and among patients who do not undergo thrombolytic therapy, the benefit of early blood pressure reduction remains uncertain. Therefore, clinical management requires a cautious and individualized approach based on reperfusion status and the patient's hemodynamic condition (Wajngarten & Silva, 2019; Gąsecki et al., 2020).

- a. In patients eligible for intravenous thrombolysis, blood pressure generally needs to be controlled to $\leq 185/110$ mmHg before treatment initiation and maintained at $<180/105$ mmHg during the first 24 hours after therapy (Wajngarten & Silva, 2019).
- b. In patients who do not receive thrombolysis, initiation of acute blood pressure reduction is generally considered when blood pressure exceeds 220/120 mmHg, with a cautious reduction of approximately 15% within the first 24 hours (Wajngarten & Silva, 2019; Cantone et al., 2021).
- c. Evidence regarding aggressive blood pressure lowering in acute ischemic stroke remains inconclusive, with many clinical studies demonstrating neutral effects on functional outcomes (Cantone et al., 2021).

In addition to pharmacological therapy, relaxation-based non-pharmacological interventions have increasingly gained attention in nursing practice due to their simplicity, safety, and potential physiological benefits. In the context of acute stroke, complementary approaches may be considered as supportive interventions to improve patient comfort and promote autonomic stabilization, although direct evidence among stroke populations remains more limited compared with that available in the general hypertensive population (Feigin & Owolabi, 2023; Sejati & Kristinawati, 2024).

Slow Stroke Back Massage (SSBM) is a therapeutic massage technique involving slow, gentle, rhythmic, and repetitive stroking movements applied to the back. Studies involving patients with hypertension and older adults have demonstrated that SSBM may reduce blood pressure and, in several studies, has also been associated with reductions in anxiety and depressive symptoms. These findings support its potential role as a complementary intervention to enhance relaxation and psychological comfort (Asriadi et al., 2026; Patonengan et al., 2023).

Slow Deep Breathing Exercise (SDBE) is a controlled breathing technique involving slow and deep respiration aimed at improving autonomic regulation. Reviews and meta-analyses have demonstrated that slow breathing enhances parasympathetic or vagal activity, reduces systolic and diastolic blood pressure, and decreases heart rate. Therefore, SDBE represents a physiologically relevant relaxation strategy for cardiovascular regulation and autonomic balance (Laborde et al., 2022; Garg et al., 2023).

Previous studies have demonstrated that non-pharmacological interventions may serve as complementary therapies for blood pressure control in patients with hypertension. Slow Stroke Back Massage (SSBM) is a massage technique involving gentle, rhythmic strokes along the back that may promote relaxation, improve blood circulation, and reduce blood pressure through stimulation of the parasympathetic nervous system (Sunaryati, 2023; Sari, 2024). Similarly, Slow Deep Breathing Exercise (SDBE) has been reported to enhance parasympathetic activity, suppress sympathetic nervous system activity, and contribute to blood pressure regulation through controlled and slow breathing patterns.

Bethesda Hospital Yogyakarta, a Type B referral hospital, provides specialized stroke unit services that enable timely stroke management during the golden period, thereby reducing the risk of disability and mortality. As a major referral center for stroke care, the hospital was selected as the setting for this study on the implementation of non-pharmacological nursing interventions, namely Slow Stroke Back Massage and Slow Deep Breathing Exercise, to promote relaxation and reduce blood pressure in patients with stroke, considering that hypertension is one of the major risk factors for stroke.

Previous studies have generally investigated Slow Stroke Back Massage and Slow Deep Breathing Exercise separately, and most have focused on patients with hypertension. Research examining the combined application of these interventions to reduce blood pressure in patients with ischemic stroke in the Emergency Department remains limited. The novelty of this study lies in the implementation of a combination of Slow Stroke Back Massage and Slow Deep Breathing Exercise in a patient with ischemic stroke and hypertension in the Emergency Department setting. Therefore, this study aims to identify and analyze the outcomes of implementing these combined interventions

in reducing blood pressure among patients with ischemic stroke. The findings are expected to provide evidence-based references for emergency nurses in applying non-pharmacological nursing interventions as an initial management strategy to reduce the risk of further complications and disease severity.

2. Literature Review

2.1. Ischemic Stroke

Ischemic stroke is a condition characterized by the sudden interruption of blood flow to a specific region of the brain, resulting in neurological dysfunction corresponding to the affected area. In the acute phase, ischemic stroke occurs due to thrombosis or embolism within the cerebral arteries, leading to reduced cerebral perfusion and subsequent ischemic injury. Compared with hemorrhagic stroke, ischemic stroke has a substantially higher incidence and accounts for the majority of stroke cases (Budianto, 2020).

2.2. Hypertension

Hypertension is a condition characterized by elevated blood pressure, defined as a systolic blood pressure of ≥ 130 mmHg and/or a diastolic blood pressure of ≥ 80 mmHg. The diagnosis is established based on the average of blood pressure measurements obtained during at least two separate clinical visits. Hypertension is a major risk factor for cardiovascular disease, stroke, chronic kidney disease, and various other target-organ complications (AHA, 2025).

2.3. Slow Stroke Back Massage

Slow Stroke Back Massage (SSBM) is a non-pharmacological massage technique that can be used to help reduce blood pressure in individuals with hypertension. The procedure involves gentle, slow, and rhythmic strokes applied to the back for approximately 3–10 minutes. SSBM is characterized by long, smooth, and repetitive movements performed simultaneously with both hands from the sacral region to the cervical area along the spinal column (Sunaryati, 2023). This therapy provides several benefits beyond blood pressure reduction. SSBM promotes relaxation, alleviates pain, and enhances blood circulation, thereby improving overall physical comfort and well-being (Sari, 2024). Consequently, it may be used as a complementary intervention for patients with hypertension, anxiety, pain, insomnia, and muscle tension in the back and shoulder regions. However, SSBM is contraindicated in certain conditions. The technique should not be performed on patients with rib fractures, burns involving the back or shoulder areas, or open wounds on the back, as massage may worsen tissue damage and delay the healing process (Rahmadi, 2024).

2.4. Slow Deep Breathing Exercise

Slow Deep Breathing (SDB) is a breathing technique performed at a rate of fewer than 10 breaths per minute with a prolonged exhalation phase. The technique is carried out consciously by regulating breathing in a slow and deep manner to induce a state of

relaxation. SDB has been shown to help reduce blood pressure, alleviate pain, and decrease levels of stress and anxiety (Helpitnati, 2023).

The beneficial effects of SDB are primarily mediated through a reduction in sympathetic nervous system activity, which subsequently decreases the secretion of epinephrine. This physiological response promotes relaxation of vascular smooth muscle and leads to vasodilation. As blood vessels dilate, peripheral vascular resistance decreases, resulting in a reduction in blood pressure (Helpitnati, 2023). Therefore, SDB can be considered an effective, simple, and non-pharmacological intervention for supporting blood pressure control and improving overall relaxation.

3. Research Method

This study employed a descriptive approach using a case study design to evaluate the implementation of a combination of Slow Stroke Back Massage and Slow Deep Breathing Exercise in a patient with ischemic stroke. The research data consisted of vital sign measurements, with a primary focus on blood pressure changes before and after the intervention.

A purposive sampling technique was used to select the study participant based on predetermined inclusion and exclusion criteria. The inclusion criteria were: (1) cooperative patients who were able to communicate effectively, (2) patients with a compos mentis level of consciousness, (3) patients diagnosed with ischemic cerebrovascular accident (CVA) accompanied by blood pressure greater than 140/90 mmHg, (4) patients and family members who agreed to participate in the study procedures and signed an informed consent form, and (5) male patients. The study involved one patient who met all inclusion criteria.

Data were obtained from primary and secondary sources. Primary data were collected through patient and family interviews, physical assessment, and direct observation. Secondary data were obtained from the patient's medical records. The research instruments included a vital signs observation sheet, a sphygmomanometer, a pulse oximeter, and a thermometer.

Data collection was conducted before and after the implementation of the combined Slow Stroke Back Massage and Slow Deep Breathing Exercise intervention. This study was based on relaxation theory, which explains that Slow Stroke Back Massage (SSBM) and Slow Deep Breathing Exercise (SDBE) can enhance parasympathetic nervous system activity while reducing sympathetic nervous system activity, thereby promoting relaxation and contributing to blood pressure reduction. Slow Stroke Back Massage is a non-pharmacological intervention that involves gentle, rhythmic, and repetitive stroking movements applied to the back for approximately 3–10 minutes.

The technique is performed bilaterally from the sacral region to the cervical area along the spinal column (Sunaryati, 2023). In addition to its potential antihypertensive effects, SSBM has been reported to promote relaxation, reduce pain, and improve blood circulation in patients with hypertension (Sari, 2024). When combined with Slow Deep Breathing Exercise, which facilitates autonomic nervous system regulation through controlled breathing patterns, these interventions may help decrease physiological stress

responses and support blood pressure control. The collected data were analyzed descriptively by comparing changes in vital signs, particularly blood pressure, across observation periods. To ensure data credibility, all measurement instruments had been calibrated prior to use, and data were collected using consistent procedures throughout the study.

4. Result

Table 1. Pre and Post Implementation Observation Results of the Combination of Slow Stroke Back Massage and Slow Deep Breathing Exercise in Mr. T at the Emergency Department of Bethesda Hospital Yogyakarta, 2026

Time	Activity	Vital Sign				
		Blood Pressure	Heart Rate	Respiration Rate	Temperature	O2 Saturation
07.46 WIB	<i>Pre Intervention</i>	195/106 mmHg	107x/m	20x/m	36,5°C	97%
08.30 WIB		207/100 mmHg	102x/m	20x/m	36,6°C	99%
08.45 WIB	<i>Post Intervention</i>	206/108 mmHg	106x/m	20x/m	36,1 °C	98%
09.00 WIB		187/103 mmHg	100x/m	20x/m	36,3 °C	98%

Post-intervention observations were conducted three times at 15-minute intervals following the implementation of the combined Slow Stroke Back Massage and Slow Deep Breathing Exercise intervention. Prior to the intervention at 07:46 a.m., the patient's vital signs showed a blood pressure of 195/106 mmHg, a mean arterial pressure (MAP) of 136 mmHg, a pulse rate of 107 x/m, a body temperature of 36.5°C, a respiratory rate of 20 x/m, and an oxygen saturation of 97%.

At the first post-intervention observation conducted at 08:30 a.m., the patient's blood pressure was 207/100 mmHg, pulse rate was 102 x/m, respiratory rate was 20 x/m, body temperature was 36.6°C, and oxygen saturation was 99%. During the second observation at 08:45 a.m., blood pressure was recorded at 206/108 mmHg, pulse rate at 106 x/m, respiratory rate at 20 x/m, body temperature at 36.1°C, and oxygen saturation at 98%.

The third observation was conducted at 09:00 a.m. The patient's blood pressure decreased to 187/103 mmHg, with a pulse rate of 100 x/m, a respiratory rate of 20 x/m, a body temperature of 36.3°C, and an oxygen saturation of 98%. Overall, a reduction in systolic blood pressure and pulse rate was observed during the final assessment, while

respiratory rate, body temperature, and oxygen saturation remained relatively stable throughout the observation period.

5. Discussion

This case report described the observed changes in blood pressure following the implementation of combined Slow Stroke Back Massage (SSBM) and Slow Deep Breathing Exercise (SDBE) in a patient with ischemic stroke accompanied by hypertension. Blood pressure demonstrated fluctuations throughout the observation period, with an initial increase after the intervention followed by a reduction during the final assessment. These findings indicate that changes in blood pressure during acute stroke management may be influenced by multiple physiological and psychological factors rather than by a single intervention alone.

The initial increase in blood pressure observed during the first post-intervention assessment may have been associated with prolonged straining during urination before the measurement. Straining during urination or defecation may activate physiological responses similar to the Valsalva maneuver, resulting in transient cardiovascular changes through increased intrathoracic pressure and sympathetic nervous system activation (Srivastav et al., 2025). In patients with hypertension and acute stroke, these responses may temporarily elevate blood pressure due to altered vascular regulation and increased cardiovascular stress.

During the second observation, blood pressure remained elevated, with a slight reduction in systolic pressure but an increase in diastolic pressure. This fluctuation may have been influenced by psychological stress experienced by the patient during the hospitalization process. Anxiety is commonly associated with increased sympathetic activity, which may contribute to elevated blood pressure through increased vascular resistance and cardiac stimulation. Qiu et al. (2023) reported that anxiety and hypertension have a bidirectional relationship, in which psychological stress may worsen blood pressure control while hypertension itself may increase emotional distress.

A reduction in blood pressure was observed during the third assessment, with systolic and diastolic pressure decreasing from 206/108 mmHg to 187/103 mmHg. This change occurred after the patient received continuous emotional support from family members and appeared more relaxed. In addition, the relaxation effects associated with SSBM and SDBE may have contributed to autonomic regulation by promoting parasympathetic activity and reducing sympathetic responses. SSBM involves gentle and rhythmic stimulation that may enhance relaxation, while SDBE may support cardiovascular regulation through controlled breathing patterns and reduced sympathetic activation.

Although the observed reduction in blood pressure following the combined intervention suggests potential clinical benefits, interpretation should be made cautiously because this report involved only one patient with a short observation period. Blood pressure changes in acute stroke patients may be influenced by various factors, including disease progression, emotional state, environmental conditions, and

concurrent medical management. Therefore, further research using controlled designs and larger samples is required to evaluate the effectiveness and clinical applicability of combined SSBM and SDBE as complementary nursing interventions for blood pressure management in patients with ischemic stroke.

6. Conclusion

This case report described the implementation of combined Slow Stroke Back Massage and Slow Deep Breathing Exercise in a patient with ischemic stroke accompanied by hypertension. Following the intervention, blood pressure showed fluctuations during the observation period, with a reduction observed in the final assessment from 206/108 mmHg to 187/103 mmHg, accompanied by a decrease in pulse rate while other vital signs remained stable. These findings indicate that the combined intervention was associated with observed changes in blood pressure and may be considered as a complementary nursing approach to support relaxation and blood pressure management in acute stroke care. However, the findings are limited by the single-case design and short observation period; therefore, further studies with larger samples, longer follow-up periods, and controlled designs are required to determine the clinical effectiveness of this intervention.

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