

Application of a Combination of Head up 30° Position and Passive Range of Motion (PROM) in Stroke Patients on National Institutes of Health Stroke Scale (NIHSS) : Case Study

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ARTICLE INFO	ABSTRACT
<p><i>Keywords:</i> Stroke, Head up 30°, PROM, NIHSS</p>	<p>The primary issue in stroke is cerebral blood flow disruption caused by abnormalities in brain blood circulation. Nursing interventions that can be performed include the 30° Head Up Position and Passive Range Of Motion (PROM), aimed at improving hemodynamic status using the National Institutes of Health Stroke Scale (NIHSS) parameters. Identifying the application of the combination of the 30° Head up Position and PROM in stroke patients regarding the NIHSS score. A case study was conducted on Mr. J's and Mr. A's in Umar Bin Khatab Room 2, Al-Ihsan Regional Hospital, West Java Province. The result of the nursing evaluation obtained: a risk of ineffective cerebral perfusion and Impaired physical mobility. There is an impact of using the combination of the 30° Head Up Position and PROM on the NIHSS score. The 30° head-up position accompanied by PROM has been proven to improve nerve status through examination with the NIHSS. These results can be directly applied to improve good health services.</p>

1. INTRODUCTION

A stroke is a clinical syndrome characterized by the acute loss of brain function, which can lead to death. It can occur due to the blockage of blood vessels in the brain, leading to restricted blood flow. This blockage can cause clots to form in the brain and result in the bursting of blood vessels, leading to damage to brain tissue due to a lack of oxygen (Wahid, M. N., & Arofiati, F. 2023).

American Heart Association (AHA) in 2024, the global prevalence of stroke from 2011-2021 showed an 8.4% increase in stroke related deaths based on age from 37.9% (AHA, 2024b). The prevalence of stroke in 2020 was reported at 7.1 million deaths due to cerebrovascular disease worldwide. In 2020, globally, 3.5 million people died from ischemic stroke, 3.3 million from intracerebral hemorrhagic stroke, and 0.4 million from subarachnoid hemorrhage (AHA, 2024a). The Southeast Asian Medical Information Centre (SEAMIC) states that the highest stroke mortality rates occurred in Indonesia, followed by the Philippines, Singapore, Brunei, Malaysia, and Thailand (Ambarika, R & Anggraini, N.A 2022).

Stroke prevalence in Indonesia increased from 7% to 10.9%, with individuals aged 75 and above ranking first, followed by those aged 65-74, and 55-64. The prevalence of stroke by doctor diagnosis in individuals ≥ 15 years old at the provincial level is 11.4% in West Java, with the

highest stroke cases diagnosed by doctors occurring in the 75 and above age group. In Bandung Regency, data for stroke patients regularly attending check-ups is 41.75% (Health Research and Development Agency, 2019). Inpatient disease patterns at hospitals for all age groups in Bandung Regency in 2019 for ischemic stroke patients were 1.34% (Department of Health of Bandung Regency, 2020).

Ischemic stroke prevalence is 96%, higher than hemorrhagic stroke at 4% (Rahayu, G., T. 2023). Stroke prevalence by gender shows more males (11.48%) than females (11.39%) (Riskesdas, 2018). Symptoms of stroke include hemiparesis, shortness of breath, slurred speech, difficulty walking, loss of balance or coordination, and muscle weakness (Wahid, M. N., & Arofiati, F. 2023). Non-hemorrhagic stroke symptoms vary depending on the patient's age, the severity of vasospasm and cardiovascular comorbidities, and individual severity level (Kemenkes, 2022). The National Institute of Health Stroke Scale Score (NIHSS) assesses the severity of stroke with 11 categories of evaluation, including consciousness level, orientation questions, response to commands, eye movements, visual fields, facial paresis, motor function of the right and left arms and legs, limb ataxia, sensation, language, and neglect or inattention (Budianto, P., et al., 2021).

Assessment of NIHSS in stroke patients may change over time depending on stroke progression or symptom resolution after nursing interventions. Higher NIHSS scores indicate more severe neurological deficits, and vice versa (Comer, A., R., et al., 2023). Assessment of NIHSS in stroke patients may change over time depending on stroke progression or symptom resolution after nursing interventions. Higher NIHSS scores indicate more severe neurological deficits, and vice versa (Comer, A., R., et al., 2023).

Neurological deficit management in stroke patients includes the Head up 30° position and Passive Range of Motion (PROM) to improve cerebral hemodynamics and motor abilities (Dewi, C., et al., 2024). Studies by Kusuma, A., H., & Anggraeni, A., D., (2021) have shown significant differences in NIHSS scores before and after interventions combining the Head up 30° position and PROM in stroke patients, indicating faster recovery.

NIHSS is widely used in Indonesia for neurological deficit assessment in stroke patients, serving as a basis for nursing diagnosis and a predictor in establishing nursing diagnoses. As part of nursing interventions, the authors were interested in studying NIHSS assessment before and after nursing interventions Head up 30° position and Passive Range of Motion (PROM) in stroke patients at RSUD Al-Ihsan West Java Province.

2. METHODS

This study employs a descriptive research design using a case study method with a nursing care approach that covers assessment, diagnosis, planning, implementation, and evaluation. It has been approved by the relevant agency as it is related to current academic practices. Patient retrieval is assisted by the head of the room. The study focuses on ischemic stroke, with inclusion criteria including patients with hemiparesis or hemiplegia, systolic and diastolic blood pressure disturbances, no loss of consciousness, and limited mobility. Two patients diagnosed with left infarction stroke in Umar Bin Khatab Room 2 at Al-Ihsan Regional Hospital, West Java Province were randomly selected for the case study. The study was conducted from October 19th to October 21st, 2023.

Data collection was conducted using both primary and secondary methods. Results were obtained from patient and family interviews, observational examinations, and supporting data. Instruments used in this research include SOP Head up 30°, SOP PROM, and the NIHSS assessment form. The intervention involved positioning the patient at a 30° head-up angle and

performing Passive Range of Motion (PROM) exercises for 10-15 minutes twice a day - in the morning and evening - for three days. The outcome measure in this study was the NIHSS score.

3. RESULTS AND DISCUSSIONS

Strokes are more common in men than in women. In men, strokes often occur due to a decrease in the hormone estrogen, which can lead to damage to blood vessels. In women, the production of estrogen decreases after menopause (Tamburian, A., G., et al., 2020). Mr. J was diagnosed with bleeding, and Mr. A's risk includes ineffective cerebral perfusion indicated by embolism and impaired physical mobility associated with neuromuscular disorders (PPNI,2017). Based on an assessment of subjective and objective data that supports the first diagnosis of two patients is ineffective cerebral perfusion risk (D.0017), which is characterized by embolism.

The risk of ineffective cerebral perfusion can be caused by hypertension, which affects the diameter of the blood vessels. This results in a reduction of blood flow to the brain, leading to an insufficient supply of oxygen and glucose to the brain tissue. Consequently, the brain tissue can gradually die, potentially leading to a stroke (Wahyuni, W. et al. 2024). The same surgical intervention was administered to both patients, in accordance with standard Indonesian procedures. This involved **monitoring intracranial pressure (I.06198)** by observing increases in blood pressure and level of consciousness, maintaining a neutral head and neck position (head up 30°) according to SOP, and documenting the monitoring results. **Management of increased intracranial pressure (I.06194)** was carried out through a combination of sedation and anticonvulsants.

After receiving nursing care for three days, Mr. J's blood pressure decreased from 153/96 mmHg to 128/84 mmHg, showing a 25 mmHg decrease in systolic blood pressure and a 12 mmHg decrease in diastolic blood pressure. Similarly, Mr. A's blood pressure decreased from 158/94 mmHg to 136/84 mmHg, with a 22 mmHg decrease in systolic blood pressure and a 10 mmHg decrease in diastolic blood pressure.

Raising a stroke patient's head by 30 degrees can improve their hemodynamic status by increasing blood flow to the brain. This is achieved through the internal jugular vein and the vertebral venous plexus, which facilitate unimpeded venous return when the head is elevated. The body's postural position impacts hemodynamics, as it causes 30% of the blood volume from the upper body to flow to peripheral tissues (Rahmah, S. et al. 2024). Importantly, the 30-degree head-up position can help reduce intracranial pressure by affecting blood pressure, ventilation, and venous flow through the jugular vein (Maulida, A.F. et al. 2023).

The second nursing diagnosis of two patients is impaired physical mobility (D.0054). Major criteria include complaints of weakness in the left extremity, difficulty moving the left extremity, and limited client movement. Mr. J's muscle strength readings are as follows: Hand - Right: 5, Hand - Left: 5, Foot - Right: 2, Foot - Left: 2. Meanwhile, Mr. A's muscle strength readings are as follows: Hand - Right: 5, Hand - Left: 5, Foot - Right: 1, Foot - Left: 1. Impaired physical mobility in stroke patients often leads to movement problems or difficulty walking due to decreased muscle strength, body balance, or immobilization (Agustin, T. et al., 2022). The nursing intervention given was the same for both patients, following Indonesian nursing intervention standards: **Mobilization Support (I.05173)** facilitating Passive Range Of Motion (PROM) movements in accordance with SOP involving the family.

After receiving nursing care for three days, In terms of muscle strength, Mr. J's assessments were as follows: Hand - Right: 5, Hand - Left: 5, Foot - Right: 2, Foot - Left: 2. Meanwhile, for Mr. A, the assessments were as follows: Hand - Right: 5, Hand - Left: 5, Foot - Right: 2, Foot - Left: 2. Both individuals experienced an increase in muscle strength, with Mr. J's left extremity

muscle strength increasing from a value of 2 to 3, and Mr. A's left extremity muscle strength increasing from a value of 1 to 2.

During PROM exercises, hand movements lead to increased blood flow in the motor cortex and somatosensory cortex on the opposite side. This happens because the motor cortex triggers changes in blood flow in the opposite part. This process is based on changes in astrocyte activity, thereby increasing neural activity that produces nitric oxide (NO). An increase in nitric oxide (NO) causes relaxation of cerebral blood vessels and an increase in regional cerebral blood flow (CBF). Local metabolism is an important factor that influences the regulation of regional cerebral blood flow (CBF). Increased activity leads to increased cerebral blood flow (CBF), which impacts perfusion. Providing an elevated head position along with upper extremity PROM supports adequate cerebral hemodynamics (Rahmah, S. et al. 2024).

On the last day of treatment, the NIHSS assessment score for Mr. J showed that on the first day he had a mild neurological deficit score of >5 , which was 5, and on the third day, there was a decrease in the mild neurological deficit score to >5 , which was 3. Meanwhile, Mr. A had a moderate neurological deficit score of 6-14, which was 8 on the first day, and on the third day, there was a decrease in the moderate neurological deficit score to 6-14, which was 6. The score for both patients decreased by 2, as evidenced by a decrease in blood pressure and an increase in limb movement as indicated by the muscle strength scale.

In a study conducted by Wardani et al. in 2022, it was found that adopting a head up position of 30° and engaging in Passive Range of Motion (PROM) therapy training for 10-15 minutes twice a day can enhance flexibility in the joints and muscles as well as in the motor system. This research aligns with the findings of a study by Kusuma, A. H., & Anggraeni, A. D. in 2021, titled "The Combination of 30° Head Position and Passive Range of Motion on the NIHSS Score in Stroke Patients," which demonstrated the influence of the combination of 30° head position and PROM on the NIHSS score in stroke patients, with a P value of 0.002 ($\alpha < 0.05$). The study showed a decrease in the NIHSS score after intervention involving a 30° head position and passive range of motion in stroke patients.

4. CONCLUSION

There is an impact of using the combination of the 30° Head Up Position and PROM on the NIHSS score. The research concludes that age, risk factors, and stroke subtype influenced differences in NIHSS scores between respondents. The study underscores the importance of nursing interventions in improving stroke outcomes.

REFERENCES

- Agustin, T., Susanti, I. H., & Sumarni, T. (2022). Implementation of Range Of Motion (ROM) exercises on muscle strength in Non-Hemorrhagic Stroke patients. *Journal of Management Nursing*, 1(4), 140-146. <https://doi.org/10.53801/jmn.v1i4.70>
- AHA. (2024a). 2022 Heart Disease & Stroke Statistical Update Fact Sheet Global Burden of Disease: A Report from the American Heart Association. *Circulation*, 145(8), E153–E639. <https://www.ahajournals.org/doi/10.1161/CIR.0000000000001052>

- AHA. (2024b). Temporal trends in incidence, recurrence and prevalence of stroke in an era of ageing populations, a longitudinal study of the total Swedish population. *BMC Geriatrics*, 19(1), 2020–2024. <https://www.ahajournals.org/doi/10.1161/CIR.0000000000001209>
- Ambarika, R., & Anggraini, N. A. (2022). Family Support for Prevention of Recurrent Stroke Events for Stroke Patients. *Journal of Global Research in Public Health*, 7(1), 8–16. <https://doi.org/10.30994/jgrph.v7i1.363>
- Budianto, P., Prabaningtyas, H., Mirawati, K. D., Putra, E. S., Muhammad, F., & Hafizhan, M. (2021). Acute Ischemic Stroke: basic and clinical aspects. (Ed. S. Pepi Budianto). Surakarta: Faculty of Medicine, Sebelas Maret University. i–123.
- Comer, A. R., Templeton, E., Glidden, M., Bartlett, S., D’Cruz, L., Nemati, D., Zabel, S., & Slaven, J. E. (2023). National Institutes of Health Stroke Scale (NIHSS) scoring inconsistencies between neurologists and emergency room nurses. *Frontiers in Neurology*, 13. <https://doi.org/10.3389/fneur.2022.1093392>
- Dewi, C., Amalia, R., & Safuni, N. (2024). Nursing care for patients with Ischemic Stroke. *Jurnal Penelitian Perawat Profesional*, 6(3), 1081-1092. <https://doi.org/10.37287/jppp.v6i3.2487>
- Department of Health of Bandung Regency. (2020). Health profile of Bandung Regency 2019. Bandung: Department of Health, Bandung.
- Health Research and Development Agency. (2018). RISKESDAS national report. Jakarta: Ministry of Health, Republic of Indonesia.
- HIPENI. (2020). Management of acute Stroke patients (Training Module for Comprehensive Nursing Care at the National Brain Center Hospital). National Brain Center Hospital: Jakarta.
- Kemenkes. (2022). The Fowler position (Sitting) and Semi Fowler position (Half-Sitting) in increasing oxygen saturation in Acute Myocardial Infarction (AMI) patients. Available at: [insert link here] https://yankes.kemkes.go.id/view_artikel/439/posisi-fowler-duduk-dan-semi-fowler-setengah-duduk-dalam-meningkatkan-saturasi-oksigen-pasien-infark-miokard-akut-imaami
- Kusuma, A. H., & Anggraeni, A. D. (2021). Combination of 30° Head Position and Passive Range of Motion on NIHSS Scores in Stroke Patients. *Jurnal Ilmu Kesehatan Bhakti Husada: Health Sciences Journal*, 12(1), 30-37. <https://doi.org/10.34305/jikbh.v12i1.251>
- Mandani, Y. R., & Saputra, G. N. (2023). Movement disorders in stroke. *Cermin Dunia Kedokteran*, 50(7), 360-364. <https://doi.org/10.55175/cdk.v50i7.642>
- Maulida, A. F. (2023). Nursing care for Hemorrhagic Stroke patients with ineffective cerebral perfusion. Semarang: Health Polytechnic of Semarang, Ministry of Health.
- Mutiarasari, D. (2019). Ischemic stroke: symptoms, risk factors, and prevention. *Medika Tadulako: Jurnal Ilmiah Kedokteran Fakultas Kedokteran dan Ilmu Kesehatan*, 6 (1), 60-73.
- PPNI, T. P. (2017). Indonesian Nursing Diagnosis Standards (SDKI): Definitions and Diagnostic Indicators (3rd Edition) 1st ed. Jakarta : DPP PPNI.
- PPNI, T. P. (2018). Indonesian Nursing Intervention Standards (SIKI): Definitions and Nursing Actions. (2nd Edition) 1st ed. Jakarta : DPP PPNI.

- Rahayu, T. G. (2023). Analysis of risk factors for Stroke incidence and Stroke types. *Faletehan Health Journal*, 10(01), 48-53. <https://doi.org/10.33746/fhj.v10i01.410>
- Rahmah, S., Ahyana, A., & Safuni, N. (2024). Nursing care for patients with Ischemic Stroke: a case study. *Jurnal Penelitian Perawat Profesional*, 6(5), 2009-2018. <https://doi.org/10.37287/jppp.v6i5.3123>
- Razdiq, Z. M., & Imran, Y. (2020). The relationship between blood pressure and Stroke severity using the National Institute Health Stroke Scale. *Jurnal Biomedika dan Kesehatan*, 3(1), 15-20. <https://doi.org/10.18051/JBiomedkes.2020.v3.15-20>
- Santoso, B. R., Gaghauna, E. E., & Raihana, R. (2023). Triglyceride and total cholesterol levels as predictors of mortality in Stroke patients: A Literature Review. *Journal of Health (JoH)*, 10(1), 009-018. <https://doi.org/10.30590/joh.v10n1.459>
- Tamburian, A. G., Ratag, B. T., & Nelwan, J. E. (2020). The relationship between Hypertension, Diabetes Mellitus, and Hypercholesterolemia with the incidence of Ischemic Stroke. *Journal of Public Health and Community Medicine*, 1(1), 27-33. <https://doi.org/10.35801/ijphcm.1.1.2020.27240>
- Wahid, M. N., & Arofiati, F. (2023). Case report: The effect of combined therapy of Passive Range of Motion and 30° Head-Up position in Non-Hemorrhagic Stroke Patients. 1-6.
- Wahyuni, W., Utami, I. T., & Fitri, N. L. (2024). Application of Passive Range of Motion (ROM) on the Range of Motion of upper extremities joints in Non-Hemorrhagic Stroke patients. *Jurnal Cendikia Muda*, 4(3), 482-489.
- Wardani, F. D., Faradisi, F., & Fajriyah, N. N. (2023, January). Application of ROM (Range Of Motion) exercise therapy to increase muscle strength in stroke patients at Batang Regional Hospital. In *Prosiding University Research Colloquium*, 597-603.