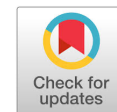


Effect of Giving a 30° Head Up Position on Increased Oxygen Saturation in Patients with Decreased Non-Hemorrhagic Stroke



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Abstract

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Introduction : Cerebrovascular accidents (CVA), or strokes, are neurological disorders caused by blockage or rupture of blood vessels in the brain and are clinically divided into non-hemorrhagic and hemorrhagic strokes. Emergency room management focuses not only on pharmacological therapy but also on non-pharmacological interventions such as body positioning to support ventilation. The 30° head-up position is known to help increase oxygen saturation in patients with respiratory distress.

Objective: To determine the effect of the 30° head-up position on increasing oxygen saturation in non-hemorrhagic stroke patients with decreased consciousness.

Method: A case study was conducted on a 61-year-old male patient diagnosed with non-hemorrhagic stroke. A comprehensive nursing assessment was conducted, and a nursing diagnosis of impaired gas exchange was established. Interventions included a 30° head-up position, 13 LPM of oxygen (NRM), effective breathing education, and collaborative therapy. Evaluation was conducted after 8 hours of care.

Results: After the intervention, oxygen saturation increased from 85% to 99%, respiratory rate decreased from 30 to 22 breaths/minute, use of accessory muscles decreased, and shortness of breath decreased.

Conclusion: The 30° head-up position is an effective non-pharmacological intervention to improve oxygenation in patients with non-hemorrhagic stroke with decreased consciousness in the emergency department (ED). This simple intervention is feasible as part of the initial patient stabilization protocol in the ED.

Keyword: Non-Hemorrhagic Stroke, Emergency Department, Head Up Position 30°, Oxygen Saturation

INTRODUCTION

Stroke, or Cerebrovascular Accident (CVA), is a brain dysfunction caused by a blockage or rupture of a blood vessel in the brain and is a leading cause of disability and death worldwide. (1) The World Health Organization (WHO) reports approximately 15 million stroke cases annually, with 5 million deaths and 5 million permanent disabilities. Non-hemorrhagic stroke is the most common type and is generally caused by atherosclerosis that blocks blood flow to the brain. (2) Stroke remains the second leading cause of death worldwide, accounting for approximately 7 million deaths, and the third leading cause of combined death and disability, measured by over 160 million disability-adjusted life-years lost (DALYs). (3)

Asia experiences a significant burden of stroke. In 2023, Asia had the largest global population, estimated at 4.7 billion. (4) Mortality rate is lowest in Japan at 43.3/100,000 person-years and Singapore 47.9/100,000 person-years and highest in Indonesia 193.3/100,000 person-years and Mongolia 222.6/100,000. The 2023 Basic Health Research Indonesia (Riskesdas) showed an increase in stroke prevalence in Indonesia from 7.0% (2013) to 10.9%. Globally, among the subtypes of stroke, ischaemic stroke (IS) comprises 65.5% of all incident strokes, in- trocerebral

haemorrhage (ICH) 28.9%, and subarachnoid haemorrhage (SAH) 5.9%. (5) Patients with non-hemorrhagic stroke generally experience nursing problems in the form of decreased intracranial adaptive capacity. This condition is a disruption in the dynamic intracranial mechanisms that compensate for stimuli, which can reduce intracranial capacity. Several nursing interventions can increase cerebral blood flow (CBF) and improve cerebral perfusion. One of these is providing a 30° head-up position. One independent nursing action is providing a 30° head-up position. (6) This is intervention also effective for patients with Brain injury. (7)

Based on this, this study aims to assess the effect of providing a 30° head-up position on increasing oxygen saturation in non-hemorrhagic stroke patients in the Emergency Department as a simple, evidence-based intervention that supports nursing practice.

METHODS

This study used a case study design to evaluate in depth the nursing care process and the effectiveness of the 30° head-up position intervention on increasing oxygen saturation in patients with decreased consciousness due to non-hemorrhagic stroke. The subject of the study was a 61-year-old male patient who came to the Emergency Department of Ibnu Sina Hospital with complaints of decreased consciousness and was diagnosed with multiple non-hemorrhagic strokes based on CT-scan results; subject selection was carried out through purposive sampling according to the research focus.

The study was conducted at the Emergency Department of Ibnu Sina Hospital Makassar on August 22, 2025, during an observation period of 1 x 8 hours. Data collection was conducted through interviews with families regarding medical history, direct observation of vital signs, breathing patterns, level of consciousness, and communication skills, physical examinations using the ABCDE and head-to-toe approaches, and review of medical record data including CT-scan results, laboratory tests, and chest X-rays. In addition, oxygen saturation (SpO₂) was monitored before and after the intervention to assess objective changes. Nursing interventions provided included providing a 30° head-up position, administering oxygen through a 13 LPM Non-Rebreathing Mask (NRM), educating families on effective breathing techniques, and collaborating with doctors in administering pharmacological therapy in the form of Amlodipine, Citicoline, and Mecobalamin.

Positional intervention was performed for the initial 15 minutes and continued with follow-up monitoring for 1 x 8 hours of observation. The instruments used in this study included a pulse oximeter to measure oxygen saturation, the Glasgow Coma Scale (GCS) to assess the level of consciousness, and vital signs and breathing pattern observation sheets to systematically document changes in the patient's condition during the intervention period.

RESULT

During the nursing care process, interventions were performed in the 30° head-up position and oxygen administration via a 13 LPM Non-Rebreathing Mask (NRM). After the initial intervention, SpO₂ increased from 85% to 99%, and the respiratory rate decreased from 30 to 25 breaths/minute. Monitoring continued for an observation period of 1 x 8 hours. Evaluation at 20.00 WITA showed that SpO₂ remained stable at 99%, respiratory rate 22 breaths/minute, and blood pressure decreased to 130/68 mmHg. The patient reported reduced shortness of breath and lighter rhonchi sounds.

Table 1. Changes in Respiratory Parameters Pre–Post Intervention of 30° Head Up Position

| Observation Time | Respiratory Rate (x/min) | SpO ₂ (%) | Use of Accessory Muscles of Breathing | Breath Sounds (Ronchi) |
|-----------------------------------------|--------------------------|----------------------|---------------------------------------|------------------------|
| Pre-Intervention (14:15 WITA) | 30 | 85 | Clear | There is |
| After 30° Head Up Position (14:45 WITA) | 28 | 88 | Still visible | There is |

| | | | | |
|-----------------------------------------------------|----|----|---------|----------------|
| After Oxygen Administration NRM 13 Lpm (15:00 WITA) | 25 | 99 | Reduce | There still is |
| Evaluation (20:00 WITA) | 22 | 99 | Minimal | Reduce |

After the patient was placed in a 30° head-up position, there was improvement in comfort and increased oxygen saturation. This position helps maximize lung expansion and increases airflow, making breathing easier. The patient continued to use accessory muscles and crackles, indicating ongoing airway obstruction.

DISCUSSION

The results of this study indicate that the 30° head-up position intervention increases oxygen saturation and stabilizes breathing patterns in non-hemorrhagic stroke patients with decreased consciousness. The increase in SpO₂ from 85% to 99% after administering the head-up position and NRM oxygen confirms that head elevation improves ventilation and airflow to the lungs. This finding is in line with Ayunika's research, which found that the 30° head-up position is effective in reducing intracranial pressure and increasing brain tissue perfusion, thereby assisting oxygenation.(6) In line with this, Anderson explained that 30° head elevation increases cerebral perfusion without significantly reducing cerebral perfusion pressure, thus having an impact on increasing oxygen saturation.(8)

The patient's improved breathing pattern, characterized by a decrease in respiratory rate from 30 to 22 breaths/minute and a reduction in rhonchi, supports the role of positioning and oxygenation interventions in maintaining airway patency. These findings align with those of clinical guidelines for stroke, which state that respiratory monitoring and position optimization are key components in preventing airway obstruction in patients with impaired consciousness. The physiological mechanisms underlying these effects are increased lung expansion and decreased thoracic pressure, resulting in more efficient gas exchange.(9)

However, the study results showed that improvements in cerebral perfusion were not optimal within the 1 x 8-hour observation period. The decrease in the patient's blood pressure from 200/70 mmHg to 130/68 mmHg was not followed by a significant increase in consciousness. This can be explained by the theory that cerebral perfusion disorders in ischemic stroke, especially with multiple infarctions as in this case, require a longer time to show clinical changes. (10) In addition, lesions in the pons, which are related to the center of consciousness, also contribute to the slow response to therapy. The study by Zhu supports that pontine infarctions have a worse prognosis regarding recovery of consciousness because they are located in vital brainstem structures.(11)

The patient's verbal communication impairment also showed no significant improvement, although a small nonverbal response indicated that sensory stimulation was still occurring. This condition is consistent with the literature that motor aphasia due to cortical lesions does not show significant changes in a short period of time and requires repeated intervention and environmental stimulation to support neuroplasticity. These findings emphasize the importance of involving family and healthcare professionals in using alternative communication methods such as gestures, pictures, or simple expressions.(12, 13)

Overall, the findings of this study indicate that the 30° head-up position intervention is effective in improving oxygenation and breathing patterns, but does not provide rapid effects on cerebral perfusion or communication skills within a short observation period. These results support the literature that simple non-pharmacological interventions such as positioning can be used as an evidence-based initial strategy to support physiological stabilization of non-hemorrhagic stroke patients in the emergency room. These findings also underscore the need for long-term monitoring of changes in consciousness and communication skills, as well as the integration of early rehabilitation into the management of stroke patients.(14-16)

CONCLUSION

This case study research shows that the 30° head-up position intervention has a positive impact on improving oxygenation in non-hemorrhagic stroke patients with decreased consciousness. The application of the 30° head-up position combined with oxygen administration via a 13 LPM Non-Rebreathing Mask (NRM) resulted in a significant increase in oxygen saturation, from 85% before the intervention to 99% after the intervention. In addition, there was

an improvement in breathing patterns as indicated by a decrease in respiratory frequency and a reduction in rhonchi on auscultation examination. However, changes in cerebral perfusion and verbal communication ability did not show significant improvements within the 1 x 8-hour observation period. These findings confirm that the 30° head-up position intervention is a simple, effective non-pharmacological step to improve oxygenation in the acute phase of non-hemorrhagic stroke, and can be used as an initial action in patient management in the emergency room.

AUTHOR CONTRIBUTION STATEMENT

All authors have read and approved the final manuscript.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest related to this research.

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