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CASE STUDY ON THE EFFECT OF ALTERNATE NOSTRIL BREATHING EXERCISE (ANBE) ON VITAL SIGNS IN HEART FAILURE PATIENTS

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ABSTRACT

Introduction: Heart failure is commonly a major cause or significant contributor to mortality. Due to this condition, heart failure patients generally experience hemodynamic instability, which is typically managed with pharmacological therapy. However, to balance the side effects of pharmacological treatments, heart failure patients also need complementary modalities that can help restore hemodynamic stability, one of which is a breathing exercise therapy known as Alternate Nostril Breathing Exercise (ANBE). **Purpose**: To evaluate the implementation of Evidence-Based Practice by analyzing the effect of Alternate Nostril Breathing Exercise (ANBE) on blood pressure, pulse rate, respiratory rate, and oxygen saturation in heart failure patients. **Methods**: The design of this scientific paper is a descriptive case study with nursing care approach for patients with heart failure. The study involved two respondents with heart failure, both experiencing shortness of breath as the main complaint. Interventions were provided twice daily for 10 minutes over a period of 5 days. evaluation is carried out formatively and summatively. **Discussion**: The ANBE intervention resulted in a decrease in blood pressure, MAP (mean arterial pressure), and respiratory rate, as well as an increase in oxygen saturation in both patients. As for the pulse rate, results tended to be stagnant when comparing pre- and post-intervention measurements within a single day; however, a decrease was observed when comparing measurements taken before the intervention and on the final day of the intervention. **Conclusion:** ANBE therapy contribute in lowering blood pressure, MAP, and respiratory rate, also improve oxygen saturation.

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INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of death globally, accounting for approximately 17.9 million deaths annually, which represent one in three global deaths (World Health Organization (WHO), 2023). These diseases are also among the four primary non-communicable diseases (NCDs) contributing to high mortality rates in Indonesia (Kementerian Kesehatan RI, 2023a). The Indonesian Health Survey in 2023 revealed a heart disease prevalence of 0.85% (Kementerian Kesehatan RI, 2023), with an increasing trend from 0.5% in 2013 to 1.5% in 2018, as highlighted in the Riset Kesehatan Dasar (Kementerian Kesehatan RI, 2022). Furthermore, cardiovascular diseases represent the highest healthcare expenditure, with Indonesia's BPJS Health data in 2021 reporting costs of IDR 7.7 trillion attributed to heart-related treatments.

Heart failure, a common manifestation of cardiovascular disease, is a complex condition resulting from impaired cardiac function that compromises the ventricles' ability to effectively fill and pump blood. This condition often leads to reduced cardiac output, causing symptoms such as fatigue, dyspnea, tachycardia, and diminished physical activity (Sari et al., 2023). These symptoms are often associated with respiratory dysfunction and decreased oxygen saturation (Malik et al., 2023). The body's neurohumoral response to reduced cardiac output can trigger sympathetic nervous system activation, which

exacerbates hemodynamic instability reflected in altered vital signs, including blood pressure, heart rate, respiratory rate, and oxygen saturation (Hsu et al., 2022).

Preliminary studies on adult patients with heart failure in Alamanda Ward in RSUD Prof. Dr. Margono Soekarjo on 26 August 2024 revealed respiratory pattern issues, even with minimal physical activity. Management of these symptoms has predominantly relied on pharmacological interventions, with limited implementation of non-pharmacological therapies. Among complementary therapies, Alternate Nostril Breathing Exercise (ANBE), a controlled breathing technique derived from yoga practices, has shown promising outcomes in improving cardiovascular health indicators (Simandalahi et al., 2020). This technique is cost-effective, simple to learn, and free of adverse effects, making it a viable option for managing heart failure symptoms (Nirmalasari et al., 2020). ANBE works by stimulating the parasympathetic nervous system, particularly the vagus nerve, to regulate heart rate, reduce blood pressure, and promote relaxation (Kalaivani et al., 2019). Therefore, this study aims to evaluate the impact of ANBE as an evidence-based practice intervention on vital signs such as blood pressure, heart rate, respiratory rate, and oxygen saturation in patients with heart failure.

METHOD

This descriptive case study aimed to systematically describe the impact of Alternate Nostril Breathing Exercise (ANBE) on the vital signs of heart failure patients, using a nursing care approach comprising assessment, diagnosis, planning, implementation, and evaluation. Two respondents, aged 30–60 years and diagnosed with heart failure, were selected through purposive sampling based on inclusion criteria, the patient has a history of one or all of the abnormal vital signs., GCS 14–15, currently not using oxygen therapy, and routine check-ups, and exclusion criteria, including condition deterioration, smoking, or non-cooperative behavior.

The study was conducted over five days per patient, from October 15–20, 2024, in Banteran Village, Central Java. Data collection involved pre-test and post-test measurements of blood pressure, heart rate, respiratory rate, and oxygen saturation. The ANBE intervention, performed twice daily for 10 minutes in a quiet setting, required participants to alternate nostril breathing with specific patterns. After finishing two sessions of ANBE, post-test measurements were taken to evaluate changes in vital signs. Data were evaluated and analyzed formatively and summatively following the nursing care framework, and results were presented in tables and narratives. Instruments used included a sphygmomanometer, pulse oximeter, and stopwatch.

RESULT

Assessment and data collection were conducted through direct observation and interviews with the clients and their families. The findings are as follows patient 1 (Mr. D), a 42-year-old male from Banteran, was diagnosed with congestive heart failure (CHF). He complained of frequent shortness of breath accompanied by epigastric pain, which he described as intermittent over the past two years, with a pain scale of 5, often occurring after meals. He has a history of tuberculosis and hyperthyroidism, for which he completed treatment. Mr. D has been hospitalized multiple times, most recently in August 2024, with shortness of breath as the main complaint. His initial vital signs showed blood pressure (BP) 150/90 mmHg, heart rate (HR) 52 bpm, respiratory rate (RR) 26 breaths/min, and oxygen saturation (SpO_2) 86%.

The assesment on patient 2 (Mrs. N), a 48-year-old female from Banteran, also diagnosed with CHF, reported shortness of breath and a dry cough accompanied by weakness and hoarseness. She denied a history of hypertension, noting her BP is generally low. Mrs. N has been hospitalized twice, with her last admission in August of the previous year due to sudden fainting caused by extreme fatigue. Her family history includes a mother with hypertension and a father with heart disease. On assessment, her vital signs were BP 110/60 mmHg, HR 55 bpm, RR 24 breaths/min, and SpO_2 96%.

Both patients were found to have a nursing diagnosis of decreased cardiac output. To address this issue, a five-day nursing care plan was developed with the goal of improving cardiac output, as indicated by reduced bradycardia, fatigue, and dyspnea, along with stabilized blood pressure. The primary intervention was the implementation of Alternate Nostril Breathing Exercise (ANBE). Patients

were instructed to alternately close one nostril while inhaling deeply through the other and then exhale through the opposite nostril, practicing this exercise twice daily for 10 minutes each session over five days. Before initiating the intervention, the researcher established an agreement with both clients, providing informational sheets and monitoring forms. Vital signs, including BP, HR, RR, and SpO_2, were measured before and after each session to monitor the therapy's effects throughout the five-day period.

Nursing interventions were implemented consecutively over five days. For Patient 2, the intervention was conducted from October 15 to 19, 2024, while for Patient 1, it was conducted from October 16 to 20, 2024. The duration and frequency of the intervention were determined based on researcher capacity and prior studies by (Kalaivani et al., 2019). Before initiating the intervention, the mechanism of the therapy was explained to the clients, and informed consent was obtained from them and their families. Key focus areas for observation in this case study included changes in blood pressure, heart rate, respiratory rate, and oxygen saturation. Measurements were taken both before and after each session to monitor progress.

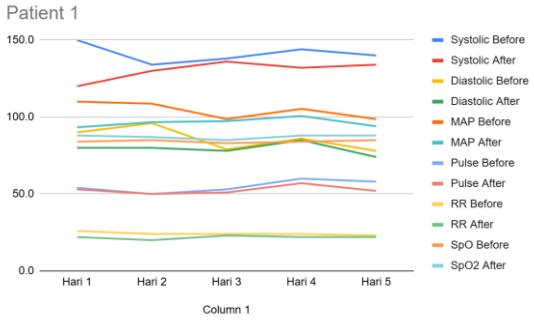

Figure 1. Vital Signs Graphic of Patient 1

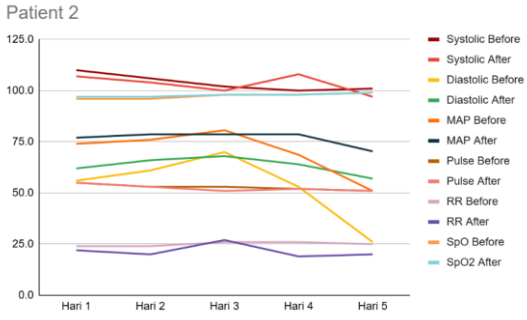

Figure 1. Vital Signs Graphic of Patient 1

Blood Pressure

The graphic shows notable changes in systolic and diastolic blood pressure over five days. Patient 1 experienced a consistent decrease in systolic, diastolic, and mean arterial pressure (MAP), demonstrating the effectiveness of ANBE in reducing elevated blood pressure. In contrast, Patient 2 showed fluctuating blood pressure readings: slight decreases in systolic pressure on most days but occasional increases in diastolic pressure. ANBE's vasodilatory effects were more pronounced in Patient 1, likely due to initially higher blood pressure, which allowed for more significant sympathetic nervous system modulation.

Heart Rate

Heart rate changes were less pronounced in both patients. Patient 1 displayed minor variations, with heart rate decreasing from 54 bpm to 52 bpm over five days. Patient 2 exhibited stable readings, with minor decreases observed only on day three (from 53 bpm to 51 bpm). The overall trend for heart rate remained relatively stable throughout the intervention.

Respiratory Rate

Both patients demonstrated gradual reductions in respiratory rate over the five days. For Patient 1, respiratory rate decreased from 26 breaths/min on day one to 22 breaths/min on day five. Patient 2 also showed a general downward trend, though a slight increase was noted on day three (from 26 to 27 breaths/min). Significant improvement was observed on day four, with a decrease from 26 to 19 breaths/min, which stabilized at 20 breaths/min by day five.

Oxygen Saturation

Oxygen saturation improved for both patients over the intervention period. Patient 1 showed an increase from 85% to 88% on the first day, with subsequent readings stabilizing between 83% and 85%. Patient 2 exhibited a steady increase in oxygen saturation, rising from 96% on day one to 99% on day five.

Overall, the results indicate that ANBE had a positive impact on reducing blood pressure and respiratory rate while improving oxygen saturation. The effects on heart rate were minimal but consistent across both patients. These findings highlight ANBE's potential as an effective complementary intervention for patients with Congestive Heart Failure (CHF).

DISCUSSION

Common symptoms experienced by patients with heart disease include changes in vital signs (tachycardia, dyspnea), discomfort, anxiety,

depression, shortness of breath, fatigue, edema, anorexia, nausea, nocturia, and decreased consciousness (Simandalahi et al., 2020). Heart failure also leads into neurohormonal regulatory changes that increase the risk of cardiovascular morbidity and mortality if not treated appropriately. The most commonly used treatment for heart failure is the pharmacological therapy; however, it often comes with side effects, such as kidney complications (Kalaivani et al., 2019). Therefore, combining pharmacological and non-pharmacological approaches, including breathing exercises like alternate nostril breathing exercise (ANBE), is necessary to balance pharmacological therapy and stabilize hemodynamics in heart failure patients (Nirmalasari et al., 2020).

In this case study, a significant reduction in vital signs, particularly blood pressure, was observed in patient 1, whereas changes in patient 2 were not as significant. This may be attributed to the fact that the research subjects had normal blood pressure and the study was conducted over a short period. The differences could also result from variations in the dosage and type of pharmacological therapy or the clinical conditions of the two patients. For Patient 1, the significant changes might have been influenced by pharmacological effects occurring between sessions 1 and 2 of the ANBE intervention. These findings align with the study by Simandalahi et al. (2020) which reported effects on vital signs in heart failure patients receiving ANBE alongside pharmacological therapy in a hospital setting.

Regarding respiratory rate, Patient 1 experienced a minimal decrease, while Patient 2 showed a more significant reduction, despite a brief increase on the third day. Oxygen saturation improved only after ANBE in Patient 1, whereas Patient 2 demonstrated a more consistent and significant improvement. These differences could be due to the varying clinical conditions of the patients, as supported by Aprilia et al., (2021), who stated that oxygen saturation in heart failure patients depends on a combination of cardiac, pulmonary, and metabolic dysfunctions.

The reduction in vital signs, such as blood pressure, mean arterial pressure (MAP), heart rate, and respiratory rate, following ANBE intervention, is attributed to a shift in autonomic nervous system activity from sympathetic to parasympathetic dominance (Upadhyay-Dhungel & Sohal, 2013). ANBE is closely associated with brain hemisphere dominance (Upadhyay-Dhungel & Sohal, 2013). Breathing through the right nostril, linked to the right spinal pathway and the left-brain hemisphere, activates the sympathetic nervous system. Conversely, breathing through the left nostril, associated with the left spinal pathway and the right brain hemisphere, stimulates the parasympathetic system, promoting relaxation. ANBE balances sympathetic and parasympathetic activity, stabilizing breathing and blood pressure while reducing dyspnea in patients (Upadhyay-Dhungel & Sohal, 2013).

The decrease in respiratory rate in this study can be explained by pulmonary stretching from lung inflation, causing relaxation of laryngeal and tracheobronchial smooth muscles. Lung stretching also voluntarily increases tidal volume and stimulates surfactant production, reducing alveolar resistance to airflow (Bargal et al., 2022). This enhances alveolar expansion, optimizing gas exchange. Breathing exercises strengthen respiratory muscles and clear airway secretions, improving abdominal and diaphragmatic breathing efficiency (Bargal et al., 2022). This leads to comprehensive lung emptying and filling, while the relaxation effects of breathing exercises reduce bronchial smooth muscle constriction (Upadhyay-Dhungel & Sohal, 2013). Additionally, ANBE improves intercostal muscle function, enhancing muscle endurance, VO2 max, and oxygen extraction by peripheral tissues, thereby increasing oxygen saturation (Khatib et al., 2017)

The study also highlights that ANBE can alleviate psychological complaints such as pain and discomfort. This is because ANBE focuses on breathing, diverting attention from daily worries and reducing stress, which decreases adrenaline release and lowers blood pressure (Upadhyay-Dhungel et al., 2013).

The findings of this case study suggest that ANBE, as a complementary therapy, can support pharmacological treatments for heart failure patients. However, it cannot be concluded that ANBE has a standalone effect on changes in vital signs. Alternate nostril breathing exercise serves not only as a physical exercise but also uniquely influences hemodynamic pressure and overall cardiovascular function. Moreover, it provides physiological benefits and contributes to overall health improvement, including increased comfort and reduced pain and anxiety levels in patients.

CONCLUSION

This study highlights the potential of alternate nostril breathing exercise (ANBE) as a complementary therapy for heart failure management. Although the results demonstrate improvements in vital signs, including reductions in blood pressure, MAP, and respiratory rate, alongside increased oxygen saturation, limitations such as pharmacological bias and patient clinical condition affected the findings. Future research should address these limitations by optimizing intervention frequency and duration, minimizing pharmacological bias, and carefully considering the safety of ANBE for patients with low blood pressure. Overall, ANBE shows promise as a safe and effective adjunct therapy that supports pharmacological treatments and contributes to the overall health and well-being of heart failure patients.

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