MINH
MALAHAYATI INTERNATIONAL JOURNAL OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024

Nomor: 79/E/KPT/2023

ARTICLE INFORMATION
Received: May, 4, 2025
Revised: May, 29, 2025
Available online: May, 30, 2025
at : https://e-jurnal.iphorr.com/index.php/minh

The effectiveness of breathing exercises in reducing dyspnea in patients with heart failure: A systematic review

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

Abstract

Background: Heart failure is a global health problem with a relatively high prevalence. Dyspnea is one of the typical symptoms of heart failure. Dyspnea can affect various aspects of life of people who are suffering from heart failure. Management of dyspnea is needed to reduce this problem and improve the quality of life of patients. One of the interventions that can be done is breathing exercises.
Purpose: To reduce dyspnea in patients with heart failure.
Method: A systematic review of articles obtained from several databases including Science Direct, Oxford, EBSCO, PUBMED, and Sage Journals, from 2015 to 2024.
Results: Based on the results of article screening based on the criteria in this study, 7 articles were obtained that explained the effectiveness of breathing exercises to reduce dyspnea in heart failure.
Conclusion: Breathing exercises can be considered as a non-pharmacological therapy to reduce dyspnea in heart failure.

Keywords: Breathing Exercise; Deep Breathing; Dyspnea; Heart Failure; Pursed Lip Breathing.

INTRODUCTION

Heart failure is a clinical syndrome that occurs due to the inability of the ventricles to fill or pump enough blood to meet the body's needs for oxygen and nutrients (Williams & Hopper, 2007). The prevalence of heart failure has reached 64 million people worldwide and this number continues to increase along with the increasing number of elderly people (Shahim, Kapelios, Savarese, & Lund, 2023). The prevalence of heart failure in Asia is also quite high. For example, in India, the prevalence reaches around 1.3 to 4.6 million people.

Indonesia is one of the countries in Southeast Asia with a relatively high prevalence of heart failure, which is 5%, while other countries such as Hong Kong (2-3%), Philippines (1-2%), South Korea (0.6%), Taiwan (6%), and Thailand (0.4%) (Savarese, Becher, Lund, Seferovic, Rosano, & Coats, 2022). The prevalence of heart failure globally is still high and continues to be a global health problem, requiring appropriate treatment and prevention strategies.

Some common complaints experienced by heart failure patients, one of which is dyspnea or shortness of breath (Zhang, Zhao, Zhang, Liu, Zhang, Chen, & Shang, 2021). Most heart failure patients who visit the emergency department come with dyspnea. However, less than 20% of patients who come to the emergency department with shortness of breath are diagnosed with heart disease (Hale, Singhal, & Hsia, 2018; Kelly, Keijzers, Klim, Graham, Craig, Kuan, & Russell, 2017; Laribi, Keijzers, Van Meer, Klim, Motiejunaite, Kuan, & Kelly, 2019). The American Thoracic Society (ATS) defines dyspnea as a subjective experience of breathing discomfort with sensations that vary in intensity.

Dyspnea in heart failure occurs due to impaired heart function with the left ventricle unable to pump blood effectively, causing increased pulmonary circulation pressure. As a result, fluid fills the alveoli,

DOI: https://doi.org/10.33024/minh.v8i3.913

disrupting the exchange of oxygen and carbon dioxide which causes the patient to experience shortness of breath (Hinkle, Cheever, & Overbaugh, 2022). Patients often experience dyspnea due to decreased heart ability to pump blood, and this discomfort can be felt both during activity and at rest (Harding, Kwong, Hagler, & Reinisch, 2023).

Dyspnea negatively impacts self-care, daily activity levels, functional capacity, quality of life, and can make it difficult for patients to adhere to treatment. Patients with severe dyspnea may experience more intense physical symptoms such as fatigue, nasal congestion, panic, pain, and increased anxiety levels (Kurt, Unsar, & Çilengiroğlu, 2024). Dyspnea arises from impaired gas exchange in the lungs, reducing the patient's ability to breathe effectively. This leads to decreased functional capacity, quality of life (QoL), increased health care costs, and even very high morbidity and mortality rates (Shahim et al., 2023). Dyspnea significantly impairs functional capacity and quality of life regardless of disease severity (Kupper, Bonhof, Westerhuis, Widdershoven, & Denollet, 2016). Based on this, it is necessary to manage and treat dyspnea in patients with heart failure.

Pharmacological therapy, such as diuretics, is commonly used to relieve dyspnea in patients with heart failure by reducing edema, pulmonary venous pressure, and preload through increased sodium and water excretion (Harding et al., 2023). In addition to pharmacological therapy, complementary therapy is also needed to overcome symptoms such as dyspnea. Nurses can implement complementary interventions to help manage dyspnea. One such intervention is breathing exercises.

Breathing exercises have been shown to increase pulmonary ventilation and improve breathing patterns (Li, Ji, Wang, Li, & Xie, 2022). Breathing exercises are a non-pharmacological approach that can help reduce dyspnea (Mahler & O'Donnell, 2014). Based on this, the purpose of this systematic review was to determine the effectiveness of breathing exercises in reducing dyspnea in patients with heart failure.

RESEARCH METHOD

A systematic review design study was conducted using multiple databases, including ScienceDirect, Oxford, EBSCO, PubMed, and SAGE Journals, covering publications from 2015 to 2024. The specific keywords used were “breathing exercises,” “pursed lip breathing,” “deep breathing,” “dyspnea,” and “heart failure.”

Articles were selected based on relevance to the topic, publication within the last 10 years, and original research articles. The PRISMA method was used to guide the selection and screening process. This systematic review was conducted using the PICO framework (Population: patients with heart failure; Intervention: breathing exercises or pursed lip breathing; Comparison: other therapy or no therapy; Outcome: dyspnea).

The inclusion criteria were randomized controlled trials (RCTs), while the exclusion criteria included review articles, book chapters, systematic reviews, and meta-analyses. Based on the search and screening, a total of 454 articles were found, of which 354 were from SAGE Journal, 44 from ScienceDirect, 14 from Taylor & Francis, and 42 from PubMed. After screening and applying the inclusion criteria, 5 articles were selected and 2 additional articles from Google Scholar. These articles were added because they met the inclusion criteria required for this systematic review. As a result, a total of seven articles were included in the analysis.

The characteristics analyzed in this study included age, gender, BMI, medical history, ejection fraction, and NYHA classification. The study samples across all articles were mostly older adults (aged 60 years or older). Four articles reported that participants had a medical history of diabetes mellitus and hypertension. Three articles described differences in ejection fraction between the intervention and control groups, with varying values. The most frequently reported NYHA functional classes in the included studies were Class II and III.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

RESEARCH RESULTS

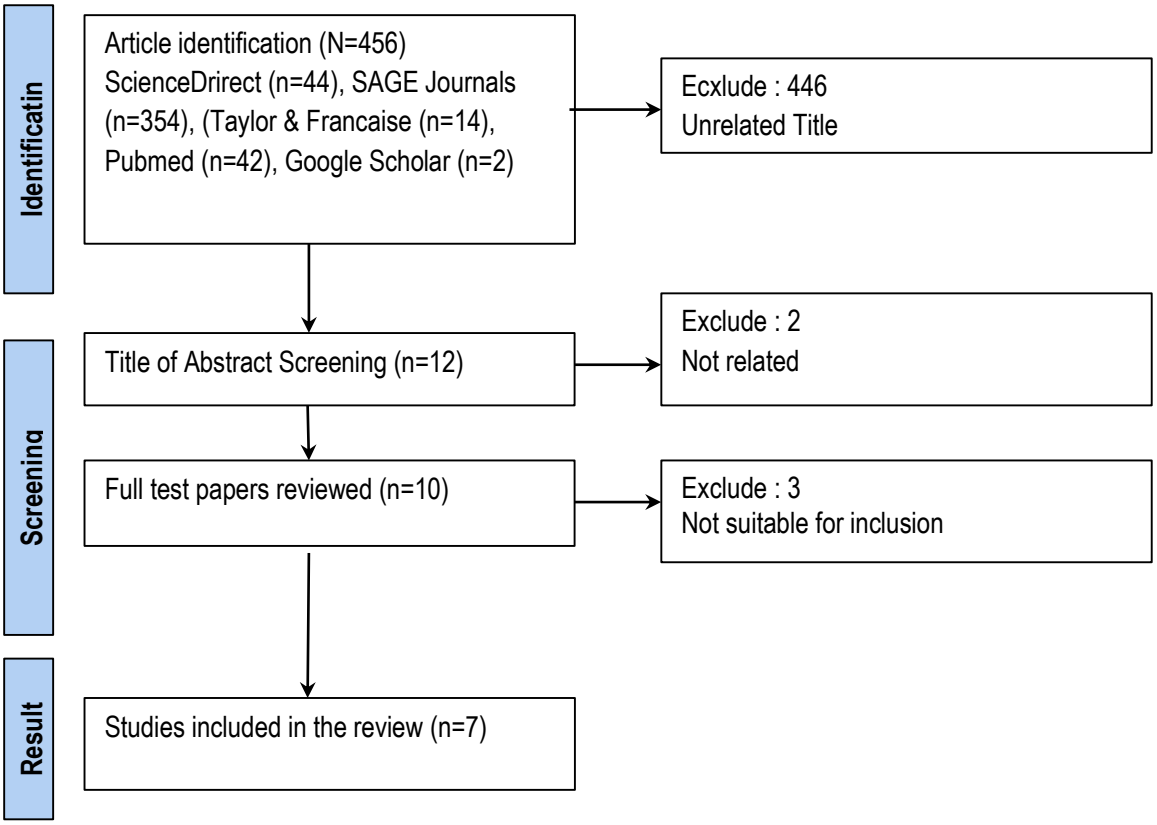


Figure 1. PRISMA Flow Diagram

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

Table 1. The Main Characteristics Of Included Studies

(Author, Year) (Country)	Purpose	Method	Result
(Seo et al., 2016) (USA)	To determine the feasibility of diaphragmatic breathing retraining (DBR) and assess whether it shows differences in dyspnea and functional capacity outcomes	Quantitative research method with experimental research design to the control group and intervention group given for 8 weeks with follow-up at 5 months. The intervention group was trained at the beginning and received four phone calls while the control group received four phone calls with general health information. This study used the Kansas City Cardiomyopathy Questionnaire (KCCQ), Likert scale for dyspnea during ADL and physical function	Results from linear mixed model analysis with effect size (η2) showed dyspnea improved in both groups, with little difference between groups. Compared with mindfulness alone, the intervention increased physical activity (calories expended; η2 = .015) and functional status (η2 = .013) at 5-month follow-up and increased activity volume at 8 weeks (η2 = .070). This intervention is feasible and shows promising effects on activity and function but not on dyspnea.
(Nasirmoghadas et al., 2025) (New York)	To examine the effect of diaphragmatic breathing on fatigue, dyspnea, and functional classification in heart failure patients	A three-arm single-blind randomized controlled trial was conducted in 90 hospitalized heart failure patients in three groups of 30 participants, including diaphragmatic breathing group (DG), incentive spirometry group (SG), and control group (CG). The intervention was carried out three times a day for 10 days in DG and SG. The Fatigue Severity Scale (FSS), Borg dyspnea scale, and New York Heart Association (NYHA) functional classification were used before and after the intervention. Data were analyzed using SPSS-20 software.	After the intervention, the frequency of patients with severe fatigue decreased by 30% in both DG and SG ($p < 0.001$); the mean dyspnea scores in DG and SG decreased by 0.7 and 0.9 units at rest ($p < 0.001$) and decreased by 2.93 and 2.73 units during activity ($p < 0.001$), respectively; the total frequency of patients in functional class III and IV decreased significantly by 30% in DG and 33.3% in SG ($p < 0.001$). The intervention groups did not differ significantly in terms of fatigue severity, dyspnea, and functional classification. While in CG, these results did not decrease significantly after the intervention.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

(Author, Year) (Country)	Purpose	Method	Result
(Solmaz et al., 2024) (USA)	To evaluate the effect of yoga and progressive muscle relaxation on dyspnea, fatigue, and self-care in heart failure patients (yoga includes diaphragmatic breathing)	The study, conducted between April 2023 and March 2024, randomized 66 heart failure patients into 3 groups (yoga breathing exercises, progressive muscle relaxation exercises, and control). The intervention group engaged in specific exercises adapted to a set regimen for 10 minutes twice daily for a 2-week period, while the control group maintained their pharmacological treatment. At the end of the intervention (week 2), yoga breathing exercises significantly improved fatigue, dyspnea, and self-care ($P < .001$), changes in saturation, heart rate, and respiratory rate favoring the intervention group ($P < .05$).	Yoga breathing exercises improve self-care, relieve fatigue, and dyspnea in heart failure. In addition, yoga breathing exercises and progressive muscle relaxation provide benefits in regulating saturation, heart rate, and respiratory rate in heart failure.
(Srimookda et al., 2021) (Thailand)	To investigate the effects of breathing exercises on dyspnea and anxiety in acute heart failure patients in the emergency department (pursed-lip and mindfulness breathing)	A two-group pre-post intervention study was conducted in the ED of a university hospital in northeastern Thailand. Data were collected from 96 AHF patients, who were equally divided into a breathing training (BT) group and a control group. The training group received pursed-lip awareness breathing training, while the control group received usual care (UC). Pursed-lip awareness breathing was administered from the first 40 minutes of arrival to the 4th hour in the ED.	Breathing training reduces dyspnea and anxiety more effectively than standard hospital care.
(Ng et al., 2021) (Malaysia)	To test the efficacy of a 20-minute mindful breathing intervention on dyspnea in heart failure patients	This study conducted a randomized, non-blinded, parallel-group controlled trial of a single 20-minute mindful breathing session plus standard care versus standard care alone among patients admitted for moderate to severe dyspnea due to acute decompensated heart failure, using the Edmonton Symptom Assessment System (ESAS)	Mindful breathing for 20 minutes effectively reduces dyspnea.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

(Author, Year) (Country)	Purpose	Method	Result
		dyspnea score, at the Cardiology Unit of the University Malaya Medical Centre in Malaysia. Thirty participants were randomly assigned to a single 20-minute mindful breathing session plus standard care (n = 15) or standard care alone (n = 15), with no differences in their demographic and clinical characteristics.	
(Alkan et al., 2017) (India)	To examine the impact of breathing exercises on dyspnea and sleep quality in heart failure patients (diaphragmatic and pursed-lip breathing)	Quantitative research method with experimental research design to the control group and intervention group given 12 weeks of intervention; 30 minutes every day. The intervention given is Basal Dyspnea Index (BDI).	Breathing exercises improve dyspnea levels and sleep quality
(Nirmalasari, 2017) (Indonesia)	To assess the effect of deep breathing exercises and active range of motion on dyspnea in heart failure patients	Quasi experimental pre post test research with control group to 32 respondents with stratified random sampling technique. The measuring instrument used is Modifield Borg scale with deep breathing exercise intervention given 30 times and continued with active range of motion for each movement 5 times.	Deep breathing exercises and ROM are effective in reducing dyspnea.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

DISCUSSION

Based on the reviewed articles, several types of breathing exercises were identified including diaphragmatic breathing, deep breathing, and pursed lip breathing. These exercises were performed routinely every day. The duration of each session varied from 5, 10, 20, or 30 minutes and the intervention was conducted over a period ranging from a few days to several weeks. The longest intervention period was 12 weeks. The level of dyspnea was re-evaluated using a measuring tool after the intervention.

Dyspnea assessment was performed depending on the patient's condition. In acute situations (e.g. during hospitalization), dyspnea was assessed immediately after the intervention (Ng, Chai, Tan, Chee, Tung, Wai, & Tan, 2021; Nirmalasari, 2017; Solmaz, Mollaoğlu, & Asoğlu, 2024; Srimookda, Saensom, Mitsungnern, Kotruchin, & Ruaisungnoen, 2021). In chronic conditions, breathing exercises are applied consistently over time and evaluated after several weeks (Nasirmoghadas, Monjazebi, Nasiri, Feyzi, & Borhani, 2025; Alkan, Uysal, Enc, & Yigit, 2017; Seo, Yates, LaFramboise, Pozehl, Norman, & Hertzog, 2016).

Dyspnea is one of the main manifestations of heart failure that often causes patients to be hospitalized (Heidenreich, Bozkurt, Aguilar, Allen, Byun, Colvin, & Yancy, 2022). Its high prevalence in hospitalized heart failure patients significantly affects functional capacity, quality of life, health care costs, and increases morbidity and mortality (Savarese et al., 2022). One of the non-pharmacological interventions to manage this symptom is breathing exercises.

Breathing exercises can serve as supportive therapy to reduce dyspnea in heart failure patients. Respiratory intervention is a promising nonpharmacological strategy to relieve dyspnea in cardiovascular patients (Eriyani, Shalahuddin, Pebrianti, & Maulana, 2024). Breathing techniques include diaphragmatic breathing, pursed-lip breathing, box breathing, yoga, and others (Hinkle et al., 2022; Norelli, Long, & Krepps, 2023). Based on the reviewed articles, the breathing methods applied were diaphragmatic breathing, pursed-lip breathing, and deep breathing.

Studies have shown that diaphragmatic breathing and deep breathing techniques are effective in reducing dyspnea in patients with heart failure (Nasirmoghadas et al., 2025; Nirmalasari, 2017; Alkan et al., 2017; Seo et al., 2016). These techniques are also applicable to patients with lung disease (Morrow, Brink, Grace, Pritchard, & Lupton-Smith, 2016). Diaphragmatic breathing helps control breathing patterns, decreases respiratory rate, increases tidal volume, and improves oxygen ventilation efficiency. It can also improve alveolar ventilation by reducing alveolar dead space and increasing arterial oxygen saturation (Hamasaki, 2020). This technique has been shown to improve respiratory rate, heart rate, and oxygen saturation (Solmaz et al., 2024).

Another technique used to reduce dyspnea is mindful breathing. Mindful breathing effectively reduces dyspnea in patients with heart failure by focusing attention on breathing without distraction (Ng et al, 2021). This technique has also shown effectiveness in managing dyspnea in patients with lung cancer, COPD, and asthma (Tan, Liam, Pang, Ng, Wong, Khoo, & Chai, 2019). Mindful breathing improves coping abilities, emotional conditions, and can indirectly affect the patient's physical condition (López-Lois, González-Barcala, & Facal, 2021). Mindful breathing helps patients concentrate on breathing, reduces external stimuli, emotional disturbances, and physiological responses (Gibson, 2019). In addition, mindful breathing regulates the respiratory rhythm, improves gas exchange, and helps relieve symptoms of dyspnea (Natarajan, 2023). Significant improvements in respiratory rate and oxygen saturation can be achieved through mindful breathing (Tan et al., 2019).

Pursed lip breathing (PLB) is an effective dyspnea management strategy in patients with heart failure, in addition to medication, oxygen therapy, comfortable positioning, and slow movement (Niu, Li, Zhao, He, Li, & Wang, 2022). Based on the reviewed articles, PLB was used in previous studies reporting a reduction in dyspnea symptoms (Srimookda et al., 2021; Alkan et al., 2017). PLB is also effective in managing dyspnea in lung diseases by promoting more physiological breathing and efficient ventilation (Ealias & Babu, 2016; Fregonezi Resqueti, & Rous, 2004). It increases tidal volume and gas exchange while reducing oxygen consumption. PLB can improve physiological parameters such as dyspnea, respiratory rate, and oxygen saturation (Abhirami &

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

Jeyavantha Santha, 2020).

Breathing exercises are a non-pharmacological intervention that has been shown to be effective in managing dyspnea. Breathing exercises reduce dyspnea through various mechanisms, such as increasing alveolar volume, improving gas exchange, and increasing arterial oxygenation (Bilo, Revera, Bussotti, Bonacina, Styczkiewicz, Caldara, & Parati, 2012; Goutama & Widjanantie, 2023). Breathing exercises also increase oxygen availability and have a positive impact on cardiac function through physiological pathways (Cahalin & Arena, 2015). Furthermore, breathing exercises improve activity tolerance, regulate breathing patterns, increase oxygen saturation, increase tidal volume, and ultimately improve quality of life (Potter, Perry, Stockert, & Hall, 2023).

CONCLUSION

Dyspnea is one of the most common complaints experienced by heart failure patients. Breathing exercise interventions can help reduce the level of dyspnea in these patients. Forms of breathing exercises include diaphragmatic breathing, pursed lip breathing, mindful breathing, and deep breathing. These interventions are carried out regularly and evaluated over a period of time. Breathing exercises can be used as a non-pharmacological therapy to relieve dyspnea in heart failure patients.

REFERENCES

Abhirami, M. M., & Jeyavantha Santha, D. C. N. (2020). Effectiveness of Pursed Lip Breathing Exercise on Dyspnoea Among Chronic Obstructive Pulmonary Disease (Copd) Patients. *IDC International Journal*, *7*(3), 21-27.

Alkan, H. O., Uysal, H., Enç, N., & Yigit, Z. (2017). Influence of breathing exercise education applied on patients with heart failure on dyspnoea and quality of sleep: A randomized controlled study. *International Journal of Medical Research & Health Sciences*, *6*(9), 107-113.

Bilo, G., Revera, M., Bussotti, M., Bonacina, D., Styczkiewicz, K., Caldara, G., & Parati, G. (2012). Effects of slow deep breathing at high altitude on oxygen saturation, pulmonary and systemic hemodynamics. *PloS one*, *7*(11), e49074.

Cahalin, L. P., & Arena, R. A. (2015). Breathing exercises and inspiratory muscle training in heart failure. *Heart failure clinics*, *11*(1), 149-172.

Ealias, J., & Babu, B. (2016). Effectiveness of pursed lip breathing exercise on selected physiological parameters among COPD patients. *International Journal of Science and Research*, *5*(5), 19-22.

Eriyani, T., Shalahuddin, I., Pebrianti, S., & Maulana, I. (2024). Deep Breathing Exercise Interventions To Reduce Dyspnea In Patients With Cardiovascular Disease: A Rapid Review. *Jurnal Aisyah: Jurnal Ilmu Kesehatan*, *9*(2).

Fregonezi, G. D. F., Resqueti, V. R., & Rous, R. G. (2004). Pursed lips breathing. *Archivos de Bronconeumología ((English Edition))*, *40*(6), 279-282.

Gibson, J. (2019). Mindfulness, interoception, and the body: A contemporary perspective. *Frontiers in psychology*, *10*, 2012.

Goutama, E., & Widjanantie, S. C. (2023). The Effect of Diaphragm Breathing Exercises on Physiological and Psychological Stress. *Indonesian Journal of Physical Medicine and Rehabilitation*, *12*(02), 197-205.

Hale, Z. E., Singhal, A., & Hsia, R. Y. (2018). Causes of shortness of breath in the acute patient: a national study. *Academic Emergency Medicine*, *25*(11), 1227-1234.

Hamasaki, H. (2020). Effects of diaphragmatic breathing on health: a narrative review. *Medicines*, *7*(10), 65.

Harding, M. M., Kwong, J., Hagler, D., & Reinisch, C. (2023). *Lewis's Medical-Surgical Nursing: Assessment and Management of Clinical Problems* (12th ed.). Elsevier.

Heidenreich, P. A., Bozkurt, B., Aguilar, D., Allen, L. A., Byun, J. J., Colvin, M. M., & Yancy, C. W. (2022). 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

Association Joint Committee on Clinical Practice Guidelines. *Journal of the American College of Cardiology*, *79*(17), e263-e421.

Hinkle, J. L., Cheever, K. H., & Overbaugh, K. (2022). *Brunner & Suddarth's: Textbook of medical-surgical nursing* (15th ed.). Wolter Kluwer.

Kelly, A. M., Keijzers, G., Klim, S., Graham, C. A., Craig, S., Kuan, W. S., & Russell, K. (2017). An observational study of dyspnea in emergency departments: the Asia, Australia, and New Zealand Dyspnea in Emergency Departments Study (AANZDEM). *Academic Emergency Medicine*, *24*(3), 328-336.

Kupper, N., Bonhof, C., Westerhuis, B., Widdershoven, J., & Denollet, J. (2016). Determinants of dyspnea in chronic heart failure. *Journal of cardiac failure*, *22*(3), 201-209.

Kurt, S., Unsar, S., & Çilengiroğlu, İ. Y. (2024). Dyspnea and Quality of Life in Patients with Lung Cancer. *Medical Journal of Bakirkoy*, *20*(4), 286–295.

Laribi, S., Keijzers, G., Van Meer, O., Klim, S., Motiejunaite, J., Kuan, W. S., & Kelly, A. M. (2019). Epidemiology of patients presenting with dyspnea to emergency departments in Europe and the Asia-Pacific region. *European journal of emergency medicine*, *26*(5), 345-349.

Li, Y., Ji, Z., Wang, Y., Li, X., & Xie, Y. (2022). Breathing exercises in the treatment of COPD: an overview of systematic reviews. *International journal of chronic obstructive pulmonary disease*, 3075-3085.

López-Lois, B., González-Barcala, F. J., & Facal, D. (2021). Application of mindfulness techniques in patients with asthma or COPD. *Journal of Asthma*, *58*(9), 1237-1246.

Mahler, D. A., & O'Donnell, D. E. (2014). *DYSPNEA; Mechanisms, Measurement, and Management* (3rd ed.). CRC Press, Taylor & Francis Group.

Morrow, B., Brink, J., Grace, S., Pritchard, L., & Lupton-Smith, A. (2016). The effect of positioning and diaphragmatic breathing exercises on respiratory muscle activity in people with chronic obstructive pulmonary disease. *South African Journal of Physiotherapy*, *72*(1), 1-6.

Nasirmoghadas, A., Monjazebi, F., Nasiri, M., Feyzi, A., & Borhani, F. (2025). Comparison of diaphragmatic breathing exercises and incentive spirometry on the functional status of heart failure patients: a randomized controlled trial. *BMC Cardiovascular Disorders*, *25*(1), 17.

Natarajan, A. (2023). Heart rate variability during mindful breathing meditation. *Frontiers in physiology*, *13*, 1017350.

Ng, D. L. C., Chai, C. S., Tan, K. L., Chee, K. H., Tung, Y. Z., Wai, S. Y., & Tan, S. B. (2021). The efficacy of a single session of 20-minute mindful breathing in reducing dyspnea among patients with acute decompensated heart failure: a randomized controlled trial. *American Journal of Hospice and Palliative Medicine®*, *38*(3), 246-252.

Nirmalasari, N. (2017). Deep Breathing Exercise and Active Range of Motion Effectively Reduce Dyspnea in Congestive Heart Failure Patients. *NurseLine Journal*, *2*(2), 159-165.

Niu, Y. N., Li, R., Zhao, P., He, P., Li, Y. L., & Wang, Y. (2022). Quantitative and qualitative research on management strategies for dyspnoea in elderly patients with coronary heart disease complicated with chronic heart failure. *Journal of Multidisciplinary Healthcare*, 2007-2013.

Norelli, S. K., Long, A., & Krepps, J. M. (2023). *Relaxation Techniques*. accessed from: https://www.ncbi.nlm.nih.gov/books/NBK513238

Potter, P. A., Perry, A. G., Stockert, P. A., & Hall, A. M. (2023). *Fundamentals of nursing* (11th ed.). Elsevier.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913

Savarese, G., Becher, P. M., Lund, L. H., Seferovic, P., Rosano, G. M., & Coats, A. J. (2022). Global burden of heart failure: a comprehensive and updated review of epidemiology. *Cardiovascular research*, *118*(17), 3272-3287.

Seo, Y., Yates, B., LaFramboise, L., Pozehl, B., Norman, J. F., & Hertzog, M. (2016). A home-based diaphragmatic breathing retraining in rural patients with heart failure. *Western journal of nursing research*, *38*(3), 270-291.

Shahim, B., Kapelios, C. J., Savarese, G., & Lund, L. H. (2023). Global public health burden of heart failure: an updated review. *Cardiac failure review*, *9*, e11.

Solmaz, G., Mollaoğlu, M., & Asoğlu, R. (2024). The Effect of Breathing and Relaxation Exercises on Self-Care, Dyspnea, and Fatigue in Heart Failure: A Randomized Controlled Study. *Holistic nursing practice*, 10-1097.

Srimookda, N., Saensom, D., Mitsungnern, T., Kotruchin, P., & Ruaisungnoen, W. (2021). The effects of breathing training on dyspnea and anxiety among patients with acute heart failure at emergency department. *International Emergency Nursing*, *56*, 101008.

Tan, S. B., Liam, C. K., Pang, Y. K., Ng, D. L. C., Wong, T. S., Khoo, K. W. S., & Chai, C. S. (2019). The effect of 20-minute mindful breathing on the rapid reduction of dyspnea at rest in patients with lung diseases: a randomized controlled trial. *Journal of pain and symptom management*, *57*(4), 802-808.

Williams, L. S., & Hopper, P. D. (2007). *Understanding Medical Surgical Nursing* (Third Edit). FA Davis Cpmpany.

Zhang, X., Zhao, C., Zhang, H., Liu, W., Zhang, J., Chen, Z., & Shang, H. (2021). Dyspnea measurement in acute heart failure: a systematic review and evidence map of randomized controlled trials. *Frontiers in Medicine*, *8*, 728772.

Kristian Ade Chandra*, Tuti Herawati, Anggri Noorana Zahra

Fakultas Ilmu Keperawatan, Universitas Indonesia
Corresponding author. *E-mail: kristianadec99@gmail.com

DOI: https://doi.org/10.33024/minh.v8i3.913