Research Article

# DIAPHRAGMATIC BREATHING EXERCISE ON INEFFECTIVE BREATHING PATTERNS IN ASTHMA PATIENTS

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**Abstract**

**Background**: Asthma is a persistent inflammatory condition of the respiratory system characterized by airflow obstruction. Individuals with asthma frequently encounter dyspnea resulting from ineffective breathing patterns. Diaphragmatic breathing exercises represent an intervention aimed at alleviating these ineffective respiratory patterns. This case study aims to delineate the nursing management of asthma patients exhibiting dysfunctional breathing patterns who were administered diaphragmatic breathing exercises as part of their therapeutic regimen. **Methods**: The research employed a descriptive case study focusing on a patient diagnosed with asthma who was admitted to Dr Gondo Suwarno Ungaran General Hospital. **Results**: The findings indicated that nursing care management, incorporating diaphragmatic breathing exercises as an intervention, was effective in alleviating dyspnea. The intervention was implemented during a single session lasting six hours, with each breathing exercise conducted for ten minutes. The patient's initial respiratory rate (RR) of 30 breaths per minute decreased to 24 breaths per minute, accompanied by an increase in oxygen saturation from 92% to 98%. **Conclusion:** Diaphragmatic breathing exercises facilitate the expulsion of carbon dioxide from the lungs, thereby decreasing respiratory workload and enhancing ventilation efficiency. It is advisable to incorporate diaphragmatic breathing exercises into the management strategy for individuals with asthma to improve oxygen saturation levels and reduce respiratory rate.

**Keywords:** Asthma, Diaphragmatic Breathing Exercise, Oxygen Saturation, Respiratory Rate

## Background

Asthma is a disease that affects people of all ages. The Global Initiative on Asthma (GINA) defines asthma as a heterogeneous disease characterized by airway obstruction caused by chronic inflammation. Based on data from the WHO, it is estimated that there are 300 million people worldwide suffering from asthma, and by 2025, the number of asthma patients is expected to reach 400 million (GINA, 2022). In Indonesia, according to data from the Indonesian Health Survey (SKI) in 2023, asthma is estimated to affect 1.6% or approximately 877,531 people. In Central Java Province, the asthma incidence rate is 1.3% or 118,184 people (SKI, 2023).

In asthma patients, there will be emergency disturbances in the airway, breathing, and circulation. Airway usually experiences increased secretions and wheezing breath sounds, while breathing will be affected by shortness of breath, abnormal breathing patterns, and decreased oxygen saturation. Meanwhile, circulation typically shows increased pulse and feelings of restlessness (Ramadani & Worwor, 2023). Ineffective breathing pattern is a nursing problem that can occur in asthma patients due to narrowing of the airways. The impact if the breathing pattern is not addressed is that the patient will experience shortness of breath, leading to an increased respiratory rate of over 30 breaths per minute, hypoxia, and respiratory failure (Udayani et al., 2020). That condition can be life-threatening for the patient if not treated.

Management of asthma can be carried out with medical and non-medical therapies. Medical therapy can include collaborative actions such as the administration of oxygen and medications like inhaled corticosteroids, short-acting beta2-agonist inhalers, and oral corticosteroids (Rosfadilla & Sari, 2022). Non-medical therapies that can be performed

include education, effective coughing, semi-Fowler's position, and breathing exercises such as diaphragmatic breathing exercises (Rahmasari et al., 2022).

Diaphragmatic breathing exercise is a technique of breathing using the diaphragm muscles slowly and deeply, causing the abdomen to rise and the chest to float (Mendes et al., 2019). The goal of this technique is to enable asthma patients who experience difficulty in ventilation to achieve controlled, optimal, and effective ventilation. This can increase oxygen saturation and improve ventilation efficiency (Astriani et al., 2021).

Based on the background of the problem, the research question is formulated as "What is the description of nursing care for asthma patients: ineffective breathing pattern using diaphragmatic breathing exercise intervention?" The objective of this study is to understand the implementation of nursing care for asthma patients: ineffective breathing pattern with diaphragmatic breathing exercise intervention.

**Method**

This research uses a descriptive method with a case study approach. The respondent used is one patient who meets the inclusion and exclusion criteria. The inclusion criteria in this case study are male or female patients aged >18 years, patients with mild to moderate asthma who have not performed breathing exercises in the last 2 months, and those who are willing to be respondents. The exclusion criteria in this case study are patients with injuries or trauma to the respiratory muscles or diaphragm and patients experiencing a heart attack.

The guidelines for writing this case study are to use the Indonesian Nursing Diagnosis Standards, Indonesian Nursing Outcomes Standards, and Indonesian Nursing Intervention Standards. In this case study, the intervention was conducted in one session lasting 10 minutes using an oximeter and a watch to measure oxygen saturation and respiratory rate before and after the diaphragmatic breathing exercise technique was administered.

The procedure for the diaphragmatic breathing exercise is as follows: position the patient in a semi-Fowler's position, instruct the patient to place one hand on the chest and one hand on the abdomen, then inhale through the nose for 4 seconds, hold the breath for 2 seconds, then exhale through the mouth with pursed lips for 8 seconds. Next, repeat the breathing exercise 5-10 times within 5-10 minutes (Tim Pokja Pedoman SPO DPP PPNI, 2021) (Frana Indra, 2024).

This case study was conducted in the Emergency Room (IGD) of dr. Gondo Suwarno Ungaran Regional General Hospital on February 8, 2025. This research has received an Ethical Feasibility Certificate from the Health Research Ethics Committee of Kusuma Husada University with Ethical Feasibility Test Number No. 2597/UKH.L.02/EC/I/2025.

**Results and Discussion**

**Results of the Assessment Before Performing Diaphragmatic Breathing Exercise**

The case study assessment on February 8, 2025, was conducted through interviews and observations at the Dr. Gondo Suwarno Ungaran Emergency Department. Based on the interview results, Mrs. S, a 60-year-old woman with a medical diagnosis of asthma for the past 9 years, presented with complaints of shortness of breath accompanied by cough, nausea, general malaise, and no history of allergies. The observational data obtained from Mrs. S show shortness of breath, retained secretions, rapid breathing pattern with a respiratory rate of 30 breaths/minute, additional wheezing breath sounds in the left lung, use of accessory respiratory muscles, oxygen saturation of 92%, prolonged expiratory phase, and cold extremities. The vital signs examination results showed blood pressure 152/107 mmHg, pulse 104x/min, respiratory rate 30x/min, and temperature 36.7°C.

**Results of the Application of Diaphragmatic Breathing Exercise Before and After the Procedure**

Table 1. Observation of Actions Diaphragmatic Breathing Exercise

| Action Observation | Pre Action | Post Actio (Broncho dilator) | Post Intervention *Diaphragmatic Breathing Exercise* |
|---|---|---|---|
| $SpO_2$ | 92% | 96% | 98% |
| RR | 30x/min | 26x/min | 24x/min |

Based on Table 1 above, it can be concluded that before the intervention, the patient experienced a decrease in oxygen saturation and an increase in respiratory rate. After the diaphragmatic breathing exercise intervention, the patient experienced an increase in saturation from 92% to 98% and a decrease in respiratory rate from 30 breaths/minute to 24 breaths/minute.

In addition to the increase in oxygen saturation and the decrease in respiratory rate, Ms. S reported a reduction in shortness of breath, with objective data showing a decrease in the use of accessory respiratory muscles, a significant improvement in respiratory frequency, a decrease in prolonged expiration phase, and improved saturation. The results of the vital signs are blood pressure 147/99 mmHg, pulse 82 beats/minute, and temperature 36.8℃.

**Discussion**

**Results of the Assessment Before Performing Diaphragmatic Breathing Exercise**

The assessment results obtained data on Mrs. S, aged 60 years, female. This is in line with the research conducted by Ajul et al., (2020) which found that the incidence of asthma is more common in women than in men during adulthood, due to the relatively smaller lung volume and capacity in women. The difference in lung size and airway characteristics between genders affects the process of oxygenation.

In terms of age, it shows that patients aged 60 years, in a study conducted by (Devia et al., 2023), state that the body's defenses will decrease due to the reduction in the elasticity of the chest wall. Changes in the respiratory structure begin in middle adulthood and often increase with age, leading to a decrease in the elasticity of the chest wall, alveolar elasticity, and lung capacity.

In the observation data, there is shortness of breath, retained secretions, a rapid breathing pattern with a respiratory rate of 30 breaths/minute, additional wheezing breath sounds in the left lung, the use of accessory respiratory muscles, oxygen saturation of 92%, prolonged expiratory phase, and cold acral areas.

Asthma can cause wheezing due to localized or widespread obstruction of the airways from the larynx to the small bronchi (Manurung & Syaputra, 2023). The narrowing of the bronchial tubes (bronchoconstriction), swelling of the airway walls (mucosal edema), or external pressure can cause the airways to constrict. Asthma causes a decrease in the oxygen levels in the blood. Hypoxemia, a condition where there is an insufficient amount of oxygen in the blood, occurs due to low oxygen levels. Persistent coughing, rapid breathing, and shortness of breath are the most common symptoms (Brunner & Suddart, 2017).

Disruptions in the respiratory tract of asthma patients will affect their respiratory status, one of which is marked by an increase in frequency. This increase is a compensatory mechanism of the body to improve the oxygenation process. However, as a result, the body will excessively use the accessory respiratory muscles, indicating an increased respiratory workload (Kartikasari & Sulistyanto, 2020).

Cold acral and pale skin in asthma patients occur due to airway narrowing and airflow obstruction, causing the patient to experience shortness of breath. This can cause hypoxia (oxygen deficiency in the blood) that occurs in peripheral circulation. The decrease in blood supply to the periphery results in a decrease in peripheral temperature (acral becomes cold) (Ramadani & Worwor, 2023).

The results from the interview assessment showed that the patient stated they do not have a history of allergies. Most patients with mild to moderate asthma, and even those with severe asthma, have a history of allergies. There is a difference between the theory and the author's findings, as there are several causes of asthma. According to Utama, (2018), idiopathic is a type of asthma that is not directly related to specific allergens. Factors such as cough and flu, upper respiratory infections, activity, and emotions can trigger asthma attacks.

The patient says they have a history of asthma for the past 9 years. Asthma is one of the few diseases that cannot be completely cured. According to Wani, (2023), recovering from an asthma attack does not guarantee that there will not be another attack in the near future. Patients always face allergens that trigger attacks, especially when it relates to their work,

environment, and economic factors.

According to the research by Kartikasari et al., (2019) which involved subjects with a family history of asthma from their parents, asthma is a chronic disease that requires regular treatment. The study concluded that diaphragmatic breathing exercises can significantly improve Peak Expiratory Flow (PEF) and reduce the frequency of exacerbations in patients with mild to moderate asthma who regularly perform these exercises.

The research by Utoyo & Nugroho, (2021) shows that diaphragmatic breathing exercise therapy is very beneficial in improving the quality of life for asthma sufferers. This therapy is considered effective because its movements are relaxed and do not drain much energy, making it a safe and comfortable exercise option for asthma patients. With the right intensity and frequency, this therapy is expected to help control and reduce asthma attack relapses.

**Results of the Application of Diaphragmatic Breathing Exercise Before and After the Procedure**

The comparison of results before and after the diaphragmatic breathing exercise on Ms. S for 10 minutes without rest intervals showed an increase in saturation from 92% to 98% and a decrease in respiratory rate from 30 breaths/minute to 24 breaths/minute. Before the diaphragmatic breathing exercise was performed, the patient was first given bronchodilator therapy with a 1-hour interval.

The application of diaphragmatic breathing exercise techniques as a non-pharmacological therapy performed for 10 minutes can increase oxygen saturation and reduce respiratory rate. In line with previous findings, the study by Salini et al., (2023) also shows that the diaphragmatic breathing exercise technique plays an important role in improving ventilation and gas exchange effectiveness. This results in more effective and smoother breathing, thereby increasing oxygen saturation in asthma patients.

In line with this, Frana Indra (2024) states that diaphragmatic breathing exercises promote the expulsion of carbon dioxide from the lungs, which in turn reduces the work of breathing and increases ventilation. This technique also increases tidal volume and optimizes oxygen uptake, while strengthening the diaphragm. Thus, diaphragmatic breathing exercises can lower the respiratory rate and improve oxygen saturation.

**Conclusion**

Based on the results of the case study and discussion regarding the application of diaphragmatic breathing exercise techniques on asthma patients, it can be concluded that the technique is effective for asthma patients with ineffective breathing patterns. This is evidenced by patients reporting reduced shortness of breath, decreased use of accessory respiratory muscles, improved respiratory frequency, decreased prolonged expiration phase, and measurements of oxygen saturation and respiratory rate, with results before the intervention showing oxygen saturation increasing from 92% to 98% and respiratory rate decreasing from 30 breaths/minute to 24 breaths/minute.

The results of this study can serve as a reference in the development of nursing science, particularly in the application of non-pharmacological interventions for asthma patients. This study emphasizes the use of diaphragmatic breathing exercises as an effort to improve more effective breathing patterns, and it can also be considered for further research in a broader scope.

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