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THE APPLICATION OF RESPIRATORY MUSCLE STRETCHING TECHNIQUES IN ASTHMA PATIENTS WITH INEFFECTIVE BREATHING PATTERNS: A CASE STUDY

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ABSTRACT

Background: Asthma is a chronic inflammatory airway disease that causes the airway to narrow. Asthma patients experience ineffective breathing patterns. To overcome ineffective breathing patterns, *the respiratory muscle-stretching technique can be used*. The purpose of this study was to determine the increase in oxygen saturation and decrease in respiratory rate after administering the Respiratory Muscle Stretching technique.
Methods: The study used a descriptive, case study design. It involved one asthma patient who experienced ineffective breathing patterns.
Results: The case study shows that applying a respiratory muscle-stretching intervention for 1x6 hours, with a training duration of 15 minutes, increased oxygen saturation from 93% to 96% and decreased breathing frequency from 28 times/minute to 24 times/minute.
Conclusion: Based on the case study results, respiratory muscle stretching techniques are effective in reducing breathing frequency and increasing oxygen saturation in asthma patients with ineffective breathing patterns.
Keywords: asthma, breath frequency, ineffective breathing, oxygen saturation, respiratory muscle stretching

INTRODUCTION

Asthma is a global health problem with a fairly high prevalence. Based on data from *World Health Organization* (2023) around 1–18% of the world's population suffers from asthma, or equivalent to 235 million people. In Indonesia, data from the Ministry of Health of the Republic of Indonesia (Kemenkes, 2019) shows that asthma is one of the most prevalent diseases among the population, with a prevalence of approximately 4.5% of the total population or around 12.6 million people.

Asthma is a chronic clinical condition that affects the respiratory tract, characterized by narrowing of the airways, inflammation, and increased mucus production that can cause difficulty breathing (Udayani et al., 2020). This condition can trigger various nursing problems, particularly those related to the airways, breathing, and circulation.

In the airways, asthma sufferers often experience narrowing, which is generally caused by the accumulation of secretions. In terms of respiration, patients may experience disturbances in their breathing patterns, characterized by increased respiratory rate and the use of accessory breathing muscles. Meanwhile, in terms of circulation, there may be an increase in vital signs as a response to the respiratory distress experienced (Hidayat, 2021)

The most dominant problem in people with asthma is ineffective breathing patterns that lead to shortness of breath and abnormal breathing (Dzulqornaian & Mardiyah, 2023).

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Poorly managed asthma can lead to decreased lung function, heart failure, respiratory failure, and death (Hashmi et al., 2024)

There are two ways to treat asthma: pharmacological and non-pharmacological therapy. Administration of oxygen and bronchodilator drugs are pharmacological treatment technique (Oktaviani et al., 2024), meanwhile, for non-pharmacological therapy, such as chest physiotherapy, which functions to improve respiratory function (Gerhanawati et al., 2023), and can also be done with gymnastic exercises, exercise, yoga, and relaxation techniques (Sutrisna et al., 2022)

One non-pharmacological technique is to provide respiratory muscle stretching, namely breathing exercises, combined with muscle stretching. Breathing exercises can help strengthen respiratory muscles, improve breathing control, and clear the airways (Da Silva et al., 2023). So that when combined with muscle training can strengthen the respiratory muscles and improve oxygenation by reducing chest wall stiffness and stretching the intercostal muscles in the inspiratory and expiratory phases (Feri et al., 2023).

Ineffective breathing patterns in asthma patients require appropriate treatment, both pharmacological and nonpharmacological. One non-pharmacological intervention is respiratory muscle stretching techniques, which aim to increase the elasticity of the respiratory muscles, improve ventilation, and increase oxygen saturation. Therefore, the application of respiratory muscle stretching techniques is expected to help overcome ineffective breathing patterns in asthma patients.

RESEARCH METHOD

This type of research used a case study research design. The case study design was chosen because this study aimed to analyze in depth the effects of respiratory muscle stretching techniques on a single subject. This study was conducted at Dr. Soeratno Gemolong Hospital in Sragen in February 2025. The subject of this study was a male asthma patient who experienced ineffective breathing patterns and had a history of asthma. Sampling in this study used purposive sampling, with inclusion and exclusion criteria, supported by medical records and patient physical examinations.

Inclusion criteria: 1) age 20-60 years, 2) patients with stable hemodynamics (systolic blood pressure 90-130 mmHg, pulse frequency 60-100 beats/min, normal temperature (Kurniati & Weti, 2023). Exclusion criteria: 1) pulmonary disorders, 2) thoracic disorders, 3) cognitive impairment (Sedaghati et al., 2023). This research has passed ethical review at Kusuma Husada University Surakarta under No. 2496/UKH.L.02/EC/2025.

This study uses an observation sheet to record oxygen saturation and breath frequency before and after the respiratory muscle stretching technique is performed, using an oximeter and a stopwatch. Respiratory muscle stretching intervention was provided once, 10-15 minutes before pharmacological therapy, to determine the effect of the techniques.

Before administering respiratory muscle-stretching techniques, initial observations are made by measuring the patient's oxygen saturation and respiratory rate, in accordance with the inclusion and exclusion criteria. There are 5 movements of the respiratory muscle stretching technique with a count of 2x10 each movement, namely: 1) relax the body, 2) lift the shoulders up, 3) bend the neck forward, 4) bend the neck sideways, 5) stretch the shoulders and triceps brachii muscles. After performing the respiratory muscle stretching technique, a break of approximately 15 minutes was given to assess the results of the exercise.

RESULTS

Assessment on Mr. S was conducted on February 3, 2025, at the Emergency Room of Dr. Soeratno Gemolong Hospital through interviews and observations. Based on the results

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of the interview, it was found that Mr. S is 59 years old with a medical diagnosis of asthma. With the results of Mr. S's observation. Mr. S appeared short of breath; there was chest wall retraction, was unable to remove sputum, and had an additional wheezing sound; looked weak. The results of the assessment of vital signs obtained blood pressure 129/87 mmHg, heart rate 100 times/min, respiratory rate 28 times/min, oxygen saturation 93%, and temperature 37.3 ℃.

Table 1. Monitoring of saturation and respiration status

Monitoring	SpO_2	Respiratory Rate
Enter IGD	92	30
Pre RMS	93	28
Post RMS	96	24

Based on the table above, after the respiratory muscle-stretching technique, oxygen saturation was 96% and respiratory frequency was 24 times/minute.

Table 2. The influence of respiratory muscle stretching techniques

Variable	Time	Pre	Post
Saturation Oxygen	18.30	93	96
Respiratory Rate	18.55	28	24

Based on the results above, the respiratory muscle stretching technique increases oxygen saturation and decreases breathing frequency in asthma patients. After 15 minutes of intervention, patients experienced an increase in oxygen saturation from 93% to 96% and a respiratory rate from 28 times/minute to 24 times/minute.

DISCUSSION

The results of the study above indicate that respiratory muscle stretching techniques increase oxygen saturation and decrease breathing frequency when performed once every 10-15 minutes for a total of 5 movements. The results show that oxygen saturation, which was initially 93%, increased to 96%, and breathing frequency decreased from 28 times/minute to 24 times/minute. This is also supported by the previous study, which shows increases in oxygen saturation and decreases in respiratory rate before and after the application of respiratory muscle-stretching techniques (Kurniati & Weti, 2023).

Respiratory muscle stretching is a type of exercise aimed at reducing chest wall stiffness by engaging the diaphragm, intercostal muscles, and respiratory accessory muscles. This allows to reduce the level of shortness of breath and increases the vital capacity of the lungs (Multazam et al., 2021).

Respiratory muscle stretching can also improve breathing patterns because the technique used aims to stretch the inspiration and expiration of the chest wall (Soukotta et al., 2022). The application of this technique can maintain optimal respiratory muscle function so that breathing patterns improve (Awachat, 2022). Respiratory muscle stretching plays a role in the process of expanding the thoracic cavity and lungs, thereby increasing the vital capacity of the lungs (Kurniati & Weti, 2023). Muscle stretching can also stimulate an acute response in the form of increased tidal volume and expansion of the chest cavity (Sevy Astriyana et al., 2024). During stretching, mechanical stress and duration contribute to morphological adaptation; systematically, stretched muscles lengthen, and the number of sarcomeres increases to reduce passive tension and maintain optimal overlap between actin and myosin (Hinks et al., 2026).

There are 5 movements of the respiratory muscle stretching technique with a count of 2x10 each movement, namely: 1) relax the body, 2) lift the shoulders up, 3) bend the neck forward, 4) bend the neck sideways, and 5) stretch the shoulders and triceps brachii muscles. Stretching movements are performed to lengthen the inspiratory and expiratory phases of the chest wall,

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thereby maximizing ventilation capacity. Respiratory muscle stretching movements can also maintain optimal respiratory muscle function, thereby improving breathing patterns. This aligns with the study's results.

Based on the results obtained, it strengthens previous research that respiratory muscle stretching has an effect on reducing the degree of shortness of breath because when training with this technique is carried out, the respiratory tract can carry out more optimal inspiration and expiration than before so that ventilation becomes adequate and increases the vital capacity of the lungs which reduces the degree of shortness of breath. Breathing muscle stretching techniques can be used as a non-pharmacological intervention to improve ventilation and reduce shortness of breath in asthma patients, especially before pharmacological therapy is administered.

Respiratory muscle stretching can be given to asthma patients who meet the inclusion and exclusion criteria. The inclusion criteria are patients aged 20-60 years with a stable hemodynamic status. Exclusion criteria include patients with cardiopulmonary, thoracic, or cognitive disorders. Respiratory muscle stretching is designed to stretch the respiratory muscles that affect chest wall compliance and reduce chest wall stiffness, thereby improving lung function and chest expansion. Breathing exercises can increase lung capacity by reducing the workload of the respiratory muscles and also increasing oxygen saturation due to the training of the inspiratory muscles (Galuh et al., 2024). Stretching movements can increase muscle fascia length. The volume and intensity of stretching induce longitudinal fascia growth, while high-intensity stretching increases thickness (Panidi et al., 2023).

Respiratory muscle stretching exercises can improve thoracic mobility through stretching exercises, so that lung expansion during inspiration is maximized. Increased flexibility and muscle function have an impact on reducing the work of breathing, because the muscles do not need to exert more effort to do inspiration, in addition, the open body posture during muscle stretching exercises causes lung capacity and gas exchange to be more optimal.

CONCLUSION

Based on the case study results, respiratory muscle stretching techniques have been proven effective in reducing breathing frequency and increasing oxygen saturation in asthma patients with ineffective breathing patterns. This effectiveness occurs because respiratory muscle stretching increases thoracic mobility, muscle elasticity, and lung ventilation. This technique can be used as an additional non-pharmacological intervention in the treatment of asthma patients. However, because this study involved only one subject, further research with a larger sample is needed to confirm these findings.

RECOMMENDATIONS

Respiratory muscle stretching exercises enhance thoracic mobility through targeted stretching, allowing maximal lung expansion during inspiration. Improvements in muscle flexibility and function reduce the work of breathing, as less muscular effort is required for inhalation. Furthermore, maintaining an upright posture during stretching exercises optimizes lung capacity and gas exchange. Respiratory muscle stretching techniques should be applied by nurses or patients as part of a non-pharmacological intervention to help reduce shortness of breath. Further research with a larger number of subjects and a longer intervention duration is needed to determine the long-term effects and generalization of this technique. Patients can be taught this technique for independent practice at home as part of their daily asthma management.

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