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LITERATURE REVIEW: THE EFFECT OF DIAPHRAGMATIC BREATHING EXERCISE ON ASHTMA

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ABSTRACT
Asthma is a disease that affects the respiratory tract in the lungs and is characterized by shortness of breath, coughing, and wheezing. An asthma treatment usually uses drugs and identifies asthma triggers. Breathing exercises are non-pharmacological therapies to overcome asthma symptoms. Diaphragmatic breathing is useful in carrying out effective breathing during an asthma attack so that sufferers do not get tired easily. This study aims to determine the effect of diaphragmatic breathing exercise (DBE) on asthma symptoms. This study uses a literature review design on electronic data-based Google Scholar, Pubmed, and ScienceDirect. 5 articles were found that met the inclusion and exclusion criteria. 1 article comparing the effect of DBE with Nostril Breathing Exercise on shortness of breath and fatigue due to asthma, one article comparing the effectiveness of DBE and Buyteko Breathing Technique (BBT) on asthma control and vital lung function. Three articles discuss the effect of DBE on decreasing respiratory rate, increasing oxygen saturation, and increasing PEFR. The management of DBT in asthma patients has an effect on asthma symptoms by reducing the workload of breathing, reducing respiratory rate and shortness of breath, increasing oxygen saturation, and improving lung respiratory function.

Keywords: physiotherapy management; physical therapy; respiratory disease

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INTRODUCTION

Worldwide, there are 300 million people with asthma, and this number is expected to increase to 400 million by 2025 due to changes in people's lifestyles and poor air quality. The prevalence of asthma ranges from 1–18% in various countries (Global Initiative for Asthma, 2019; Rahmasari et al., 2022). Asthma is a chronic condition that affects the airways in the lungs. In people with asthma, the airways become swollen and inflamed, causing more mucus than usual. Asthma has symptoms such as shortness of breath, coughing, wheezing (a whistling sound when breathing) and chest tightness or pain. The severity of symptoms can vary from mild to severe and can be triggered by a variety of factors, including allergens, air pollution, exercise, respiratory infections or changes in the weather. Asthma management usually involves the use of medications to control symptoms and prevent asthma attacks, as well as identifying and avoiding asthma triggers whenever possible. In some cases, breathing exercises may also be recommended as an additional therapy to help manage symptoms (Global Initiative for Asthma, 2019).

Breathing exercises have been widely used worldwide as a non-pharmacological treatment for people with asthma (Harper & Trayer, 2022). Diaphragmatic breathing exercises are one of the effective non-pharmacological therapies for people with asthma. This exercise involves the active use of the diaphragm muscle to assist in the breathing process, which can produce

several benefits for people with asthma. Diaphragmatic breathing exercises, either alone or in combination with other physical exercises, have been shown to be an important part of more effective asthma management (Astuti & Huriah, 2022). Diaphragmatic breathing exercises (DBE) have significant benefits in reducing shortness of breath, especially for patients with conditions such as asthma. DBE aims to improve the effectiveness of breathing by using the diaphragm muscle more efficiently. Through this exercise, patients can prevent air from being trapped in the lungs caused by airway obstruction, which is one of the main causes of shortness of breath in asthma patients. DBE also helps the respiratory muscles work better, respiratory disorders become milder, tolerance to activity increases, and symptoms of dyspnea are reduced. In addition, relaxation techniques obtained from DBE can reduce anxiety, reduce the work of breathing, and increase alveolar inflation, all of which contribute to reducing shortness of breath. Studies have shown that DBE significantly changes respiratory function, including decreasing respiratory rate and increasing peak expiratory flow (RR and PEF) indicating that it is effective in reducing shortness of breath in asthma patients. (Rahmasari et al., 2022).

Asthma can affect anyone and affects all age groups in both developing and developed countries (Elsaid et al., 2023). Asthma is a condition that requires special attention as the degenerative process that occurs with age can cause airway inflammation and decreased lung function (Rahmasari et al., 2022). Asthma can have a significant impact on reduced physical activity and sleep disturbances. Patients with asthma often have difficulty in performing physical activities due to symptoms such as coughing, wheezing and shortness of breath which can limit their participation in sports and social activities. In addition, asthma symptoms that often occur at night can disrupt sleep patterns, causing patients to wake up frequently at night. Lack of quality sleep can cause daytime fatigue, decreased concentration, and affect performance at school or work. Asthma also has a significant impact on stress and socio-economic life of patients. Unexpected asthma attacks can cause stress and anxiety. This condition not only affects the patient's mental health but can also worsen asthma symptoms, creating a cycle that is difficult to break (Elsaid et al., 2023). Based on the introduction above, asthma is a serious problem if not treated properly. Asthma treatment can be done pharmacologically and non-pharmacologically. Non-pharmacological interventions for asthma are gaining attention because of their potential to complement traditional pharmacological treatments, improve patients' quality of life, and reduce drug dependence. One of non-pharmacological treatment is Diaphragmatic Breathing Exercise. Therefore, this literature review was conducted with the aim of analyzing the benefits of Diaphragmatic Breathing Exercise to treat complaints in asthma patients. This study is nessesary to consolidate existing evidence, assess the effectiveness of these techniques, and identify gaps in the literature. The review provides a comprehensive understanding of how diaphragmatic breathing can improve asthma management, particularly in improving quality of life and reducing dependence on medication

METHOD

This study was designed using a literature review, which details the theories, results, and other research materials obtained from reference materials. Literature analysis includes reviews, summaries, and author's thoughts on the topics discussed from various library sources, such as articles, books, slides, information from the internet, etc., which are relevant, actual, and adequate. This study was conducted from various sources, including national and international journals, and three databases (Pubmed, ScienceDirect, and Google Shoolar), as well as relevant textbooks or handbooks on research findings. Title keywords such as "Ashtma" AND "Diaphragmatic Breathing Exercise" are identified based on the relevance of

the journal content and the relevance of the research topic in the search for journal articles published from 2014 to 2024. After the articles are collected, the researcher groups a number of articles that have been collected based on the relevance of the topic of diaphragmatic breathing exercises for asthma. The researcher also groups articles based on the year of research. The most important articles come from the last five years of research, but if there is a topic or discussion that has not changed, the article will be expanded to the last ten years of research. Furthermore, the researcher conducts a structural explanation analysis on the articles that have been grouped to determine the relationship between the articles and the research topic. The author then checks whether the journals are related to each other. The researcher adds other journal articles and textbooks to strengthen and improve the discussion of the research results. After the articles are grouped, the researcher conducts a structural explanation analysis regarding the relationship between the articles and the research topic. To analyze the results of this literature review, the critical analysis method is used. Critical analysis is the process of analyzing journals to create theories about the differences, similarities, and shortcomings of the journals used.

RESULT

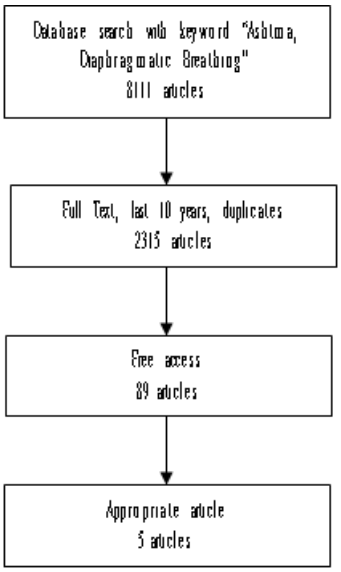

Figure 1. PRISMA Flow Diagram

Based on the results of the journals search on Google Scholar, Research Gate, and Pubmed with keywords “Asthma” and “Diaphragmatic Breathing Exercise”, researchers found 8111 journals according to the keywords with a time span of 2014-2024. A search on Pubmed found 1 study with the words Asthma and Diaphragmatic Breathing Exercise, on Google Scholar yielded 4 journals, due to the large number of duplicate. Meanwhile no journals were found according to the criteria. A total of 8111 journals found were screened and assessed by looking at the following criteria: first, journals that describe the provision of diaphragmatic breathing exercises for asthma patients. This is because researchers need journals that describe how diaphragmatic breathing exercises play a role for asthma patiens. Then the second is journal that use quantitative study design. A total of 8022 journals were eliminated in the screening and assessment process because they did not meet the criteria mentioned. So that there are 89 journals left are available in full text and free access and only 5 matched the criteria.

Table 1.
PICO Analysis

No	Autors	Population	Intervention	Comparation	Output
1	Ibrahim Abd El Kader et al, 2023	60 repondents with severe asthma	Diaphragmatic breathing exercise	Nostril breathing exercise	Arabic of the dyspnea-12 questionaire, the mean total dyspnea score in group 1 and group 2 decreased significantly to (22.7±4.8;20.4±5.3) respectively compared to (33.0±3.3;33.9±4.7) Arabic vertion of the brief fatigue onventory scale. There was a statistically significant difference in the mean total fatigue score (p=0.000) before and after in the intervention for both group studied. In addition, after intervention, the mean total dyspnea score did not change statically between group 1 and group 2, and the mean total fatigue score change statically significantly between group 1 and group 2 (p=0.005).
2	Salini et al, 2023	56 respondents with asthma in the Kubutambahan II Health Center Working Area	Diphragmatic breathing exercise	-	The oxygen saturation value after being given the Diaphragmatic Breathing Exercise tehnique showed that frequency of oxygen saturation in range of 96%-100% was 49 people (87.5%) with the standart category and in the range of 90%-94% wa 7 people (12.5%) with the mild hypoxemia with an average value of 96.61%.
3	Astuti &Huriah.,2022	15 respondent with bronchial asthma in Kalideres Health Center work area	Diphragmatic breathing exercise	-	Before Diphragmatic breathing exercise, the mean PEFR values were 246.67 L/min and 300 L/min (p-value 0.00)
4	Elsaid et al., 2023	60 respondent with asthma	Diphragmatic breathing technique (DBT)	Buyteko Breathing Technique (BBT)	Spirometry to measure lung function. 1. Both intervention groups were able to increase lung capacity as follows : VC: DBT p 0.012;BBT p 0.000 2. FVC:BBT p 0.043; BBT p 0.011 3. FEV1/FVC%: DBT p 0.010; BBT p 0.000 4. PEFR: DBT p 0.000; BBT p 0.000 The Asthma Control Test to measure asthma symptom control: DBT and BBT can both improve asthma symptom control with each p value 0.000<0.05
5	Rahmasari et al.,2022	14 patient surveyed were in internal Medicine Room 2 Of Dr.R Soedarsono Pasruruan Regional Hospital	Diphragmatic breathing exercise	-	There was no significant difference between the treatment and control groups in term of the decrease in the the number of breaths after the test, but the comparison of the post-test breath values between the treatment and control groups showed a p-value of 0.167, with all p-values greater than 0.05, indicating that H1 was rejected and H0 was accepted.

DISCUSSION

Diaphragmatic breathing exercises, which can be done anywhere and anytime, are a safe and effective way to manage asthma symptoms and also improve quality of life and physical function. (Ibrahim Abd El Kader et al., 2023). Dyspnea can occur in people with asthma due to respiratory distress despite hyperventilation, which makes breathing more difficult because no air enters the lungs (Akbar et al., 2020; Azzahra et al., 2022). Breathing exercises are a common method to improve respiratory dysfunction. These respiratory retraining programs aim to help people with asthma breathe using better breathing patterns during daily life or when they experience dyspnea by teaching them to breathe using better breathing patterns. Breathing exercise protocols usually consider the number of minutes and tidal volume, and encourage people to exercise at home, change their breathing patterns, and use breathing techniques (Courtney, 2017; Harper & Trayer, 2022; Sankar & Das, 2018). Properly performed breathing retraining can result in improvements in various aspects of respiratory dysfunction, including biochemical, biomechanical, or psychophysiological aspects; asthma control; medication use; symptoms of respiratory dysfunction; and quality of life (Courtney et al., 2019). Biochemical and biomechanical dimensions can respond to breathing protocols to pursue hyperventilation, control respiratory volume, hypertonic respiratory muscle relaxation, and teach patients to adopt a more normal breathing pattern, regardless of whether or not they are experiencing dyspnea. Breathing retraining can include important elements of the psychophysiological aspects of respiratory dysfunction, such as using relaxation techniques and emotional and mental self-regulation tools to reduce tension and anxiety (Courtney, 2017; Courtney et al., 2019).

Individuals diagnosed with asthma experience difficulty breathing due to narrowing of the airways, which causes decreased oxygen diffusion, which results in decreased oxygen concentration in the bloodstream and decreased oxygen saturation will occur in clinical conditions (Salini et al., 2023). For patients with asthma, diaphragmatic breathing exercises are performed to improve lung ventilation by maximizing inspiration through the nose and reducing the work of the respiratory muscles. This improves perfusion and performance of the alveoli so that oxygen diffusion is more effective, which increases the amount of oxygen in the lungs. Diaphragmatic breathing exercises can reduce the work of breathing, increase ventilation, and remove carbon dioxide (CO2) from the lungs due to the expiration of contractions of the respiratory muscles in people with asthma. One method of breathing exercise is diaphragmatic breathing exercises, which focus on the use of the diaphragm muscle when breathing (inspiration and expiration) (Hamidah et al., 2023). According to researchers, the Diaphragmatic Breathing Exercise technique can help patients improve ventilation and make gas exchange more effective so that breathing becomes effective, and because patients can breathe smoothly, oxygen saturation in asthma sufferers can increase (Salini et al., 2023). Diaphragmatic breathing exercises have also been shown to improve HRQoL, peak expiratory flow, reduce anxiety and depression levels, which are associated with dysfunctional breathing such as hyperventilation, thus normalizing the autonomic system (Evaristo et al., 2014). It is very important to do exercises to maintain fitness and good respiratory function because decreased lung capacity will affect tolerance to daily activities (Astriyana et al., 2023; Zahirah et al., 2022).

CONCLUSION

Diaphragmatic breathing exercises have the potential to improve autonomic respiratory quality of life (HRQOL), peak expiratory flow, and levels of anxiety and depression associated with dysfunctional breathing such as hyperventilation. By performing these exercises, they can help normalize the autonomic system. Performing exercises to maintain

fitness and good respiratory function is essential because decreased lung capacity will affect tolerance to daily activities.

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