



Breathing Exercise for Chronic Obstructive Pulmonary Disease Patient: Scoping Review

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ABSTRACT

Chronic Obstructive pulmonary disease is a respiratory disorder that cause several symptoms as dyspnea, chronic cough and fatigue. These symptoms can be overcome by doing breathing exercise. This scoping review to determine the benefits and types of breathing exercises in COPD patient. The databases used in the scoping review are PubMed, Science Direct, ClinicalKey for Nursing. The inclusion criteria were English articles, COPD patients. The final results obtained 7 articles that meet the criteria in scoping review. The analysis shows that yoga breathing exercise. Pursed-lips breathing, inspiratory and expiratory muscle training which can increase oxygen saturation, mucus production, vital lung capacity, the value of six minute walk tests, reduce dyspnea and frequency exhalation. The conclusion of the review of the seven articles that the Breathing exercise consist of several types of exercises that can reduce symptoms or problems experienced in COPD patient.

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Latihan Pernapasan pada Pasien Penyakit Paru Kronis: Scoping Review

ABSTRAK

Penyakit paru obstruktif kronis adalah gangguan pernafasan yang menimbulkan beberapa gejala seperti sesak nafas, batuk kronis dan kelelahan. Gejala-gejala tersebut dapat diatasi dengan melakukan latihan pernafasan. Scoping review ini bertujuan untuk mengetahui tentang manfaat dan jenis latihan pernafasan pada pasien PPOK. Tinjauan scoping review menggunakan pencarian beberapa database antara lain PubMed, Science Direct dan ClinicalKey for Nursing. Kriteria inklusi yaitu artikel bahasa Inggris, pasien dengan penyakit paru obstruktif kronis (PPOK). Hasil akhir didapatkan tujuh artikel yang memenuhi kriteria dalam scoping review. Analisis menunjukkan bahwa latihan pernafasan terdiri dari berbagai jenis yaitu yoga breathing exercise, pursed lips breathing, diaphragmatic breathing, inspiratory dan expiratory muscle training yang dapat meningkatkan saturasi oksigen, produksi lendir, kapasitas vital paru, nilai tes berjalan enam menit, menurunkan sesak nafas dan frekuensi pernafasan. Kesimpulan ulasan dari tujuh artikel latihan pernafasan terdiri dari beberapa jenis latihan yang dapat mengurangi gejala atau masalah yang dialami pada pasien PPOK.

Kata kunci:

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INTRODUCTION

Chronic obstructive pulmonary disease is a chronic respiratory disorder that causes symptoms of chronic cough, difficulty breathing and wheezing (Backman et al., 2020). Based on the global Burden of Disease study, it shows that around 3.2 million people die from chronic obstructive pulmonary disease, more than 90% occur in middle and low economic countries and around 28.29% of active smokers are the cause of COPD (Adhikari et al., 2020).

A total of 13 studies show that the main factors for chronic obstructive pulmonary disease are tobacco exposure and the use of biomass or solid fuels (Zhu et al., 2018). Due the exposure, patient with chronic obstructive pulmonary disease often experience symptoms of dyspnea to avoid these symptoms COPD patients usually avoid excessive physical activity (Donnell et al., 2020).

Basic treatment can be done with none-pharmacological therapies such as smoking cessation, regulating lifestyle and exercises to reduce symptoms in chronic obstructive pulmonary disease patients disease patients is breathing exercise (Lu et al., 2020). Breathing exercise is a breathing exercise that aims to improve the performace of the respiratory organs by breathing properly and regulary, there are several types of breathing exercise such as pursed-lips breathing, diaphragmatic breathing, singing exercise and ventilator feedback training alone (Ubolnuar et al., 2019).

Breathing exercise include a pulmonary rehabilitation program that can be done at home and can improve lung function. In addition, breathing exercise is a good long-term rehabilitation program for COPD patients to increase respiratory muscle strength (Lu et al., 2020). This scoping review aims to determine the benefits and types of breathing exercise in COPD patients.

METHOD

The method used in this scoping review, which is combining summary, explanation, and interpretation of quantitative and qualitative studies, is different from the systematic review where this type of scoping review requires identification of all literature regardless of the deagain of the research. Along with the increased knowledge of researchers in scoping reviews allows researchers to define search terms, where the main focus in this writing is to provide a general picture of the research evidence that has been conducted on the breathing exercise for chronic obstructive pulmonary disease patient (Sucharew & Macaluso, 2019).

Search are conducted by searching for relevant literature through PubMed, Scince Direct and Clinicalkey for Nursung using keywors Breathing exercise OR Training Muscle OR; Diaphragm Exercise OR Pursed-Lips Breathing OR Yoga Breathing Exercise OR Singing Exercise AND COPD OR Chronic Obstructive Lung Disease OR Chronic Obstructive Pulmonary Diseases.

The inclusion criteria for this scoping review are the main articles published in 2016 to 2021, English articles, patient with chronic obstructive pulmonary disease (COPD) and articles with free full text. The exclusion criteria for this article included articles that did not complete the research methodology and articles that did not provide a complete manuscript.

After finding the appropriate article the author performs the analysis by reading the title and abstract first an determeining the article that fits the inclusion criteria. Then the author reads the article in its entirety.

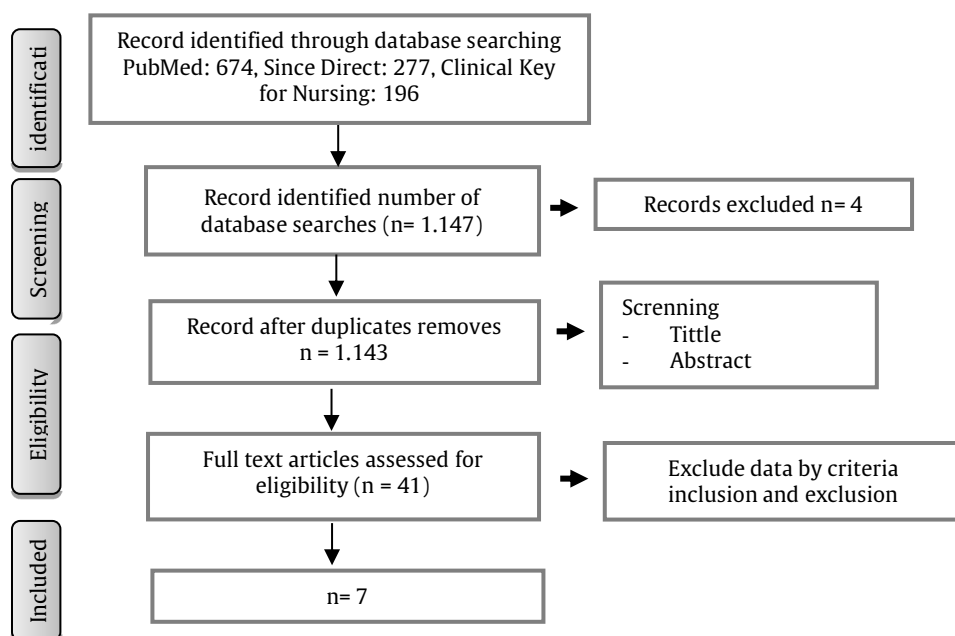


Figure 1.
 PRISMA (Search and Screening Strategy) of literature review

RESULT AND DISCUSSION

A total of 7 articles reviewed on breathing exercises, including yoga breathing, pursed-lips breathing technique

and a combination of pursed-lips breathing with diaphragmatic breathing. These types of breathing exercises have benefits for patients with chronic obstructive pulmonary disease, namely that they can increase oxygen

saturation, the value of the six-minute walk test and lowering blood pressure, pulse, respiratory rate and dyspnea scale in patients (El-saidy, et al., 2019; Kimisky.et al., 2017; Ranjita, et al., 2016; Shakei, et al., 2018).

Breathing exercises can increase tidal volume and increase sputum production thereby providing better respiratory function as indicated by a significant increase in arterial oxygen saturation and lung vital capacity of the patient (Nair, et al., 2019; Shen, et al., 2021). In addition, breathing exercises can be done with inspiratory and expiratory muscle exercises, with these exercises, with these exercises can increase the value of maximum inspiratory pressure, partial pressure of oxygen (PaO₂), partial pressure of carbon dioxide (PaCO₂), oxygen saturation of oxygen (SpO₂) and 6 minute walk test (Maheni, 2017).

Breathing exercise are a method that can reduce symptoms and improve lung function in patients with chronic obstructive pulmonary disease characterized by increased gas change in the lungs, increase the strength of the respiratory muscles, optimize chest wall movement, reduce pulmonary hyperinflation and reduce dyspnea (Ubolnuar et al., 2019). Breathing exercise are non-pharmacological therapies that aim to control asthma. The method of breathing exercises can be done with breathing techniques, yoga breathing and diaphragmatic breathing (Santino et al., 2020).

Technique Breathing

Breathing exercise can be done is several ways such as active cycle breathing technique. The way to practice active cycle breathing is divided into three stages the first to control the breathing by means of the patient sitting relaxed in a chair, breathe at normal rate and depth using your lower slow speed using your lower chest then hold the breath 2 seconds the exhale completely and the last with forced expiration. Can help increase sputum production and provides better respiratory function which is indicated by significantly increases the arterial oxygen saturation and lung vital of the patient (Shen et al., 2021).

In line with research (Nae & Herve, 2019) stated that an increase in the amount of sputum secretion by suction can increase the oxygen saturation of the patients. Due to the accumulation of secretions or excessive phlegm in the lungs it will block the airway in the patient which will block the entry and exit of air to and from the lungs. So that it can reduce the amount of oxygen entering and causes the absorption of oxygen by the blood to decrease so that the patients oxygen saturation value is not normal.

Yoga Breathing

Yoga breathing is combined abdominal breathing, chest and clavicle to maximize breathing volume and can increase oxygen uptake. Relaxing and slow breathing yoga exercises can change the frequency of the heart rate during and after exercise (Lopes et al., 2018). Yoga breathing can decrease the symptoms of dyspnea, decrease fatigue characterized by change in oxygen saturation and improved patient pulse rate. Because when the patient breathes in a relaxed manner will affect the sympathetic nerves for carry out oxygen exchange in the greater alveolar, by dilating the bronchioles in the lungs thereby reducing in the patient (Ranjita et al., 2016).

Breathing practice with yoga breathing pranayama recommends slow and relaxed breathing, because it will reduce hyperinflation in patients with chronic obstructive

pulmonary disease, so that it will reduce dyspnea and can improve the six minute walk test exercise in patients (Kaminsky et al., 2017).

Pursed lips Breathing

Breathing exercise can be done with pursed-lips breathing exercise that is, inspiration through the nose and expiration by mouth. The expiratory phase is longer than the expiration (Nguyen & Duong, 2021).

Pursed-lips breathing is a breathing exercise that relaxes the neck and shoulders. Then inhale the nose until it presses on the lips and stomach, than exhaled through pursed lips. The exercise can increase oxygen saturation, lower respiration rate, and diastolic systolic blood pressure in COPD patients (Sakhaei et al., 2018). In line with research conducted by (Ardhany et al., 2019) states that pursed-lips breathing practice can decrease the respiration rate due to increased air resistance, adequate breathing and increased gas exchange in the lungs.

Diaphragmatic Breathing

Diaphragmatic breathing consist of slow inspiration that uses diaphragm (muscle that separates the heart and lung organs from the stomach) aimed at increasing ventilation at the base of the lung (Lage et al., 2018).

The combination pursed-lips breathing and diaphragmatic breathing can increase tidal volume significantly, due to the volume of the final inspired rib and final abdominal inspiration without change at the change at the end of expiration of chest wall volume and there is a decrease in respiratory rate. Due to the decrease in expiratory flow resulting in a decrease in air pressure in the airway (Nair et al., 2019). Likewise research (El-saidy et al., 2019) states the combination pursed lips breathing and diaphragmatic breathing in COPD patients can increase oxygen saturation, lowered respiratory rate, CAT score and dyspnea scale.

Inspiratory and Expiratory Muscle Training

Patients with obstructive pulmonary disease experience fatigue of the inspiratory and expiratory muscles, to overcome this can do inspiratory muscle exercises and expiratory or combination. Inspiratory and expiratory muscle exercise can increase the strength of the respiratory muscles and as rehabilitation in COPD patients (Mehani, 2017). The benefits of inspiratory muscle training can increase the value of P_{imax} 60-80%, a six-minute walking distance and pulmonary functional capacity (Figueiredo et al., 2020).

After doing inspiratory muscle exercises, the expiratory muscle strength of sports player increases significantly. The increase was due to previously weak respiratory muscles prior to BMI (Mackała et al., 2020).

Table 1. Summary of article

Researcher Name and Year	Title	Purpose	Characteristics of Respondents	Research Design	Type Breathing Exercise	Result
(Kaminsky et al., 2017)	Effect of yoga breathing (Pranayama) on exercise tolerance in patients with chronic obstructive pulmonary disease: A randomized control trial	To determine the effect of pranayama in COPD patients	Patients aged > 18 years diagnosed with COPD with symptoms of shortness of breath as indicated by a FEV1 value <80%	Randomized control trial	Yoga Breathing (Pranayama)	After 12 weeks there was an increase in 6MWD in the intervention group, from 22 minutes to 65 minutes, and there is a decrease in hyperinflation with a marked increase in IC in patients
(Shen et al., 2021)	Role of active cycle of breathing technique for patients with chronic obstructive pulmonary disease: A pragmatic, randomized clinical trial	To determine the effect of active cycle breathing techniques on viscosity and sputum production in COPD patients	Patients aged > 18 years who signed an inform consent, has no cognitive impairment, had no terminal disease	Randomized control trial	Breathing Technique	Active cycle breathing techniques can significantly increase sputum production and provides better respiratory function characterized by increased arterial oxygen saturation and vital capacity of the patient's lungs significantly
(Ranjita et al., 2016)	Yoga-based pulmonary rehabilitation for the management of dyspnea in coal miners with chronic obstructive pulmonary disease: A randomized controlled trial	To evaluate the effectiveness of Yoga Therapy (IAYT) with dyspnea and fatigue in coal miners with COPD	Male miner, non-smoking, age 36-60, FEV1 <80%	Randomized control trial	Yoga	Yoga breathing can reduce fatigue and dyspnea characterized by changes in oxygen saturation and the patient's pulse rate improves.
(Sakhaei et al., 2018)	The impact of Pursed-lips Breathing Maneuver on Cardiac, Respiratory, and Oxygenation Parameters in COPD Patients	To determine the pursed-lips breathing effect on heart, lung and oxygenation index in COPD patients	Respondents were healthy patients and patients with COPD who were > 40 years old, there are no comorbidities, willing to be a respondent in the study	Randomized control trial	Pursed-lips Breathing	There was an increase in SPO2 in the healthy intervention group from 94.5% to 96.90% and COPD group from 92.10% to 93.25%, besides that, there was a decrease in the value of RR, systolic and diastolic blood pressure in both groups
(Nair et al., 2019)	Effects of Diaphragmatic Breathing With and Without Pursed-Lips Breathing in Subjects With COPD	To assess the effect of diaphragmatic inhalation and diaphragmatic breathing combined with pursed-lips breathing	Patients aged 45-75 years who do not experience psychiatric problems, not undergoing pulmonary rehabilitation	Quasi-experiment	Diaphragmatic breathing and without pursed-lips breathing	Diaphragmatic breathing rather than combined with pursed-lips breathing can increase tidal volume, and decreased in respiratory rate, the addition of pursed-lips breathing can result in larger changes in breathing parameters
(El-saidy et al., 2019)	Effect of Combining Diaphragmatic and Pursed Lips Breathing Exercises on Clinical Outcomes of Elderly Patients with Chronic Obstructive Pulmonary Disease	To determine the effect of a combination of diaphragmatic breathing exercises and pursed-lips breathing in elderly patients with COPD	Are 60 years of age or older, with stable COPD and agreed to be a respondent	Experiment-Semu	Diaphragmatic and Pursed Lips Breathing Exercises	There are differences in pre and post results on the SPO2 value, respiratory frequency, CAT score and the patient's dyspnea scale score.
(Mehani, 2017)	Comparative study of two different respiratory training protocols in elderly patients with chronic obstructive pulmonary disease	To compare inspiratory muscle exercises and expiration in elderly patients with COPD	Men aged 50-60 years, not following the rehabilitation program	Randomized control trial	IMT and EMT	After the IMT the patient showed a significant improvement in lung function value (MIP, PaO2, PaCO2, HCO3, SaO2% and six minute walk test) and after EMT the patient had an increase in scores (EMT, SpO2%, PaO2 and six minute walk test)

LIMITATION OF THE STUDY

In our scoping review, there may be a bias against published scientific studies being considered in the selection of literature. Additionally, set date and language restrictions may affect research review and may have excluded some topics. Other concerns include the simple quality of research studies, heterogeneity and sample size.

CONCLUSION AND SUGGESTION

Based on a review of the seven articles, it can be concluded is an breathing exercises are very important in COPD patients who are undergoing rehabilitation or not. Providing breathing exercise is beneficial for COPD patient, namely decrease dyspnea, cough, fatigue, increase oxygen saturation, and helps expel mucus production in the lungs of COPD patients. When the symptoms and problem in COPD patients are resolved it will improve the quality-of-life expectancy of the patient.

Suggestion for the next author, namely to be able to conduct research related to the effectiveness of this type of breathing exercises for COPD patient.

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Conflict of Interest Statement

The authors report there is no conflict of interest. The authors themselves will be responsible for the content and writing of the paper.

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