Effectivity Of Pursed-Lips Breathing To Decrease Respiration Rate (RR) in Patient with COPD: A Systematic Review

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Abstract: Introduction: COPD is one of disease that increase morbidity and mortality in the world. Pharmacology intervention only was not effective to overcome dyspnea as the most visible symptom of COPD. Pursed-Lips Breathing is a nonpharmacological therapy which is effective to help COPD patient to reduce dyspnea. The objective of this systematic review was to describe effectivity of Pursed-Lips Breathing to decrease Respiration Rate (RR) in patient with COPD. Method: 15 best articles were found using PECOT framework in some databases; EBSCO, Science Direct, Scopus, ProQuest, Pub Med, Wiley and Springer Link. Those articles have been chosen based on some criteria. Result: Pursed-Lips breathing that given for about 1 – 24 months was found effective to decrease Respiration Rate in patient with COPD. Discussion: Pursed-Lips breathing was highly recommended for patient with COPD to reduce dyspnea.

1 BACKGROUND

Chronic Obstructive Pulmonary Disease (COPD) is a preventable and treatable disease characterized by persistent respiratory distress, airway shortage and alveolar abnormalities usually caused by abnormal inflammatory responses from exposure to dangerous particles or gases (GOLD, 2017). According to the Global Initiative for Chronic Obstructive Lung Diseases (GOLD) 2017, the factors that influence the progression of this disease are age, genetic, hyperresponsive airways, poor lung development at the time of childhood, socioeconomic status related to status nutrition, infection and often associated with smoking habits as well as history of work in places containing pollution. The disease is characterized by symptoms of progressive chronic pneumonia, 30% of patients with cough sputum production, wheezing, chest feels heavy, weakness, anorexia and weight loss.

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of increased morbidity and mortality in the world. By 2020 it is estimated that COPD is the third leading cause of death after cardiovascular disease (Domini et al., 2015). The COPD death rate increased by 147%, this increase in proportion to the higher prevalence of smoking in various countries, air pollution and other fuels that are key risk factors for COPD (Mark et al., 2013). The presence of alveoli damage to Chronic Obstructive Lung Disease can alter respiratory physiology, thus affect overall oxygenation of the body. The above will bring the bronchial inflammatory process and also cause damage to the terminal bronchiolus wall. As a result of damage to the bronchial wall of terminalis will occur small bronchial obstruction (bronchiolus terminalis), resulting in closure or obstruction early expiratory phase. Easy air enters the alveoli at the time of inspiration, at the expiration of many trapped in the alveoli and there is air trapping. This is what causes the shortness of breath with all the consequences. The presence of obstruction at the beginning of expiration will cause expiratory difficulties and lead to elongation of the expiratory phase, so that lung functions including ventilation, gas distribution, gas diffusion and blood perfusion will be impaired (Bortle, 2013).

One of the most common symptoms reported by patients with COPD is shortness of breath (Bhatt et al., 2013). Breathing is the most commonly used reason for patients with COPD seeking medical help (Borge et al., 2015). According to (Chawla et al., 2013) that 70% of patients with respiratory disorders found complaints of shortness of breath, these
symptoms were associated with decreased oxygen saturation and functional capacity.

Pharmacologic treatment alone is ineffective in treating the symptoms of shortness of breath in patients with COPD, so a nonpharmacological approach is needed as adjunctive therapy for the management of shortness of breath in patients with COPD. Breathing exercises are one of the most effective and efficient non-pharmacological treatments to help COPD patients overcome the condition of the disease (Domini et al., 2015). Respiratory exercise is done to get a better breathing arrangement from the previous fast and shallow breathing to breathing more slowly and deeply. Pursed-lips breathing exercises and pursed-lips modification with breathing diaphragm, abdominal and walking 6 minutes are a combination of efficient breathing exercises to reduce shortness of breath, promote gas exchange and ventilation (Chawla et al., 2013).

Through this systematic review the investigators wanted to know the effectiveness of the application of pursed-lips breathing exercises against decreased respiration rate (RR) in patients with COPD.

2 METHODS

2.1 Type of Studies

This study is a systematic review compiled by Randomized Control Trial (RCT) research journal, and is expanded by non-RCT research because of the limited journal with the topic in question.

2.2 Inclusion and exclusion criteria

The inclusion criteria were articles on pursed-lips breathing exercises and a combination of pursed-lips breathing exercises with breathing diaphragms, abdominal, and breathing exercises with a 6 minute walk and the effect of respiratory exercise on decreased respiratory rate (RR) in COPD patients, while the exclusion criteria were articles which does not have the full text of the pdf format, the provision of interventions other than the respiratory exercise referred to in the inclusion criteria.

2.3 Literature search strategies

Search articles according to PICOT Framework (Population: COPD patient, Intervention: Respiratory Exercise, Control: -, Outcome: Decrease Respiration Rate (RR), Time: 2007 - 2017). Based on keywords in accordance with the framework and searching for articles in electronic databases: Scopus, Ebsco, Science Direct, ProQuest, Pub Med, Wiley, Springer Link are limited to the last 10 years 2007 to 2017. From search results in accordance with the PICOT Framework identify 10 articles from scopus, 9 articles from EBSCO, 8 articles from science direct, 7 articles from ProQuest, 11 articles from Springer Link, 10 articles from Pub Med, and

![Flow chart for systematic review study](image-url)
after further review selected 15 articles from International Journal for review.

3 RESULTS

Of the 15 journals conducted the review of the number of samples varied between 12-1,492 respondents and the duration of breathing exercise intervention between 1 month to 12 months. All studies related to effective breathing exercises as one of the non pharmacological interventions to decrease respiratory rate (RR) in patients with COPD.

3.1 Pursed-Lips breathing Exercises

Patients with Chronic Obstructive Pulmonary Disease (COPD) who have been given education on pursed-lips breathing exercises and apply them continuously can be useful to increase confidence in their ability to manage shortness of breath. This long-term breathing exercise is effective against decreased respiration rate (RR) and increased SPO2 (Roberts et al., 2016). Respiratory training in patients with Obstructive Lung Disease (COPD) can also be provided using a telecommunication system. Pursed-lips breathing practice instruction through interactive telecommunication system (skype) has been shown to be effective for shortness of breath, increased physical activity, quality of life and self-efficacy (Mark et al., 2013).

According to (Visser et al., 2011) in his research there is an increase in inspiratory capacity after pursed-lips breathing exercises in patients with Chronic Obstructive Pulmonary Disease (COPD), thus decreasing symptoms of shortness of breath. Provision of pursed-lips breathing exercises provides a good effect on the breathing pattern, which increases tidal volume and decreases respiration rate (RR) compared with quiet natural breathing (QB). Pursed-lips breathing exercises with arm supports (WAS) and arm and head support (WAHS) can increase inspiratory muscle activity during inspiration rather than neutral position (NP) position (Kim et al., 2012).

Studies conducted (Medica et al., 2014) suggest that pursed-lips respiration decreases dynamic hyperinflation, thus increasing exercise tolerance, decreasing respiration rate (RR) and increasing SPO2. This is also supported by research (Pereira De Araujo et al., 2015) that pursed-lips respiration reduces the dynamic hyperinflation on Glittre ADL test but not on a walking test (6MWT).

3.2 Exercise Respiratory modification of pursed-lips, abdominal, diaphragm, walking exercises 6 minutes, muscle relaxation

Currently modification of breathing exercises is used in the pulmonary rehabilitation and breathing exercise program. Several studies of respiratory exercise modification have been shown to be effective in reducing respiratory rate (RR) in patients with Chronic Obstructive Pulmonary Disease (COPD). Respiratory breathing modification of pursed-lips, diaphragm, and walking exercises of 6 minutes by moving the upper arm for 30 minutes in the morning and afternoon is continuously very effective for decreasing shortness of breath in patients with COPD (Domini et al., 2015), while long-term breathing exercises (12 months), which include pursed-lips, abdominal and upper and lower limb movement exercises are effective for decreasing shortness of breath, improving lung function, activity tolerance and reducing acute exacerbations for COPD patients (Xi et al., 2015).

Pulmonary rehabilitation is a series of interventions consisting of conventional treatment, disease education, treatment of pursed-lips, abdominal breathing exercises and limb muscle relaxation given to patients with chronic obstructive pulmonary disease (COPD). The provision of this 12-week intervention effectively reduced breathlessness, increased exercise capacity and improved quality of life in moderate to severe COPD patients (Xu et al., 2017).

Provision of pursed-lips breathing exercise interventions with a 6 minute walking exercise has acute benefits in training capacity, can sustainably improve exercise capacity in stable COPD patients. (Bhatt et al., 2013). The same study was conducted by (Damle, Shetye and Mehta, 2016) that breathing pursed-lips by walking 6 minutes (six minute walk) is more effective than walking 6 minutes (six minute walk) without pursed-lips breathing, ie there is less increase in rate respiratory rate (RR), HR and systole blood pressure in the 6-minute intervention group with pursed-lips respiration compared with a 6-minute walking group without pursed-lips respiration. Modification of physical exercise, inspiratory exercise and breathing exercises increases exercise capacity and decreases shortness of breath during physical effort, but inspiratory muscle training more effectively increases the strength and endurance of the inspiratory muscles so that it will decrease shortness of breath. Patients
with respiratory muscle weakness given by inspiratory muscle exercise have a higher advantage for strength and muscle strength inspiration but not for shortness of breath and submaximal training capacity (Basso-Vanelli et al., 2016).

Research conducted by (Spielmanns et al., 2016) incorporates pursed-lips breathing exercises, aerobic exercise and strength training in groups of pulmonary rehabilitation programs. In this study demonstrated that exercise capacity and quality of life could be improved in patients with COPD, this study supports the positive effects of pulmonary rehabilitation in COPD patients.

Other studies that incorporated pursed-lips breathing exercises with diaphragmatic breathing and chest expansion exercises with inspiratory muscle training showed a significant decrease in the dyspnea scale, a significant decrease in heart rate (HR), a significant decrease in respiratory rate (RR) and showed improvement which are significant in chest expansion variables, SPO2 as well as functional capacity (Chawla et al., 2013).

4 DISCUSSION

The presence of alveoli damage to Chronic Obstructive Pulmonary Disease (COPD) may alter respiratory physiology, thus affecting overall oxygenation of the body. One of the most common symptoms reported by patients with COPD is shortness of breath (Bhatt et al., 2013). Breathing is the most commonly used reason for patients with COPD seeking medical help (Borge et al., 2015).

Pharmacologic treatment alone is ineffective in treating the symptoms of shortness of breath in patients with COPD, so a nonpharmacological approach is needed as adjunctive therapy for the management of shortness of breath in patients with COPD. Breathing exercises are one of the most effective and efficient non-pharmacological treatments to help COPD patients overcome the condition of the disease (Domini et al., 2015). Pursed-lips breathing exercises and continuous application can be beneficial to increase confidence in their ability to manage shortness of breath. With pursed-lips breathing can prolong the period of ekshalasi, increase muscle relaxation, reduce breathing work and reduce dynamic hyperinflation. This long-term breathing exercise is effective against decreased respiration rate (RR) and increased SPO2 (Roberts et al., 2016).

Pursed-lips breathing exercises with diaphragmatic breathing and chest expansion exercises with inspiratory muscle training showed a significant decrease in the dyspnea scale, a significant decrease in heart rate (HR), a significant decrease in respiratory rate (RR) and showed a significant improvement in the variables chest expansion, SPO2 as well as functional capacity (Chawla et al., 2013). In this systematic review the author only discusses the effect of pursed lip breathing on one variable only respiration variable rate (RR) with duration of long-term respiratory exercise intervention.

5 CONCLUSIONS

Pursed-lips breathing exercises and a combination of pursed-lips with abdominal breathing, diaphragm or a 6-minute walk can be used as nonpharmacologic therapy in patients with chronic obstructive pulmonary disease (COPD). Pursed-lips breathing and pursed-lips combination with abdominal breathing, diaphragm or 6 minute walking exercise can reduce breathing work, increase maximal alveolar inflation, increase muscle relaxation, decrease dynamic hyperinflation to decrease respiration rate (RR), increase SPO2 and improve significant in functional capacity.

Pursed-lips breathing or pursed-lip combinations with abdominal breathing, diaphragms and a 6-minute walking exercise should be applied as one of the nonpharmacological treatments in patients with COPD. This intervention is a cheap intervention so that it can be done by all patients with COPD from all levels of the economy to assist them in overcoming the condition of the disease. The hope together with pharmacological therapy may prevent acute exacerbations in patients with COPD.

REFERENCE


