

## Original Research Article

# The effect of pursed lip breathing exercise against decrease of breathing levels in chronic obstruction pulmonary disease

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**Received:** 12 August 2019

**Revised:** 30 September 2019

**Accepted:** 09 October 2019

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## ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD) is a disease that is a problem throughout the world where its prevalence, morbidity and mortality are increasing every year. The high number of COPD visits is due to persistent and progressive shortness of breath complaints. Existing pharmacological therapies for COPD have not shown improvement in the long-term decline in pulmonary function that is a hallmark of COPD. It is very necessary for companion therapy that is non-pharmacological treatment is expected to be able to complete pharmacological treatment in reducing shortness of breath of COPD patients with pursed-lip breathing exercise.

**Methods:** This study uses a quassy experiment design with two group pretest and posttest design approaches. This study was in obstructive pulmonary disease patients in the lung hospital in West Sumatra with an intervention group of 16 and a control of 16 respondents. Data analysis using univariate and bivariate using independent t-test statistics.

**Results:** The results showed the average decrease in shortness of breath in the control group without pretest 3.19 and posttest 2.56 in the pretest pursed lip breathing exercise intervention group 3.19 and posttest performed 1.69. Test statistic p-value 0.026.

**Conclusions:** There is an effect of pursed lip breathing exercise on reducing the level of shortness of breath in patients with chronic obstructive pulmonary disease.

**Keywords:** Chronic obstructive lung disease, Pursed lip breathing exercise, Respiratory rate

## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is very interesting to talk about because the prevalence and mortality rates continue to increase. COPD is a progressive disease involving the respiratory tract or lung parenchyma which results in airway obstruction.<sup>1,2</sup> Data from WHO shows COPD causes respiratory disorders more than 65 million people worldwide and more than 3 million people died due to respiratory problem, is expected to continue to increase and reach the third highest cause of death in 2030.<sup>3</sup> Riskesdas in 2013, the death rate due to COPD was ranked 6th out of ten causes of death in Indonesia with an average COPD prevalence of 3.7%. West Sumatra ranks 23rd in the number of

COPD in Indonesia with a prevalence of 3.0%.<sup>4</sup> The visit of COPD at the West Sumatra Lung Special Hospital in 2016 was 2,404 and increased to 2,715 in 2017, the visit ranks first among several other respiratory problems (TB pulmonary 1,557 and pneumonia 1,149).

COPD treatment is generally done with pharmacological therapy which aims to reduce the symptoms, frequency and severity of exacerbations and improve health status and exercise tolerance. Existing drugs for COPD have not shown improvement in the long-term decline in lung function that is characteristic of COPD.<sup>5</sup> Non-pharmacological treatment methods are expected to be able to complement pharmacological treatment in

reducing shortness of breath of COPD patients with pursed-lip breathing exercise.<sup>6</sup>

Pursed lip breathing exercise (PLB) is a breathing exercise by breathing air through the nose and expelling air by means of lip tightening or adjusting to regulate the frequency and pattern of breathing so as to reduce air trapping, improve alveoli ventilation to improve gas exchange without increasing respiratory work, regulating and regulating breathing coordinate the speed of breathing so that breathing is more effective and reduces shortness of breath.<sup>5</sup> Exercises respiratory (breathing retraining) provide a good benefit in COPD patients, such as pursed-lip breathing can prevent lung collapse and helping patients control the frequency and depth of breathing.<sup>7,8</sup>

Edwin research, explained the results of 0.007 for respiratory rate (RR) and 0.004 for pulse oxygen saturation (SpO<sub>2</sub>).<sup>9</sup> It was concluded that there was an effect of pursed lip breathing on the reduction of RR and SpO<sub>2</sub> in COPD patients. According to Faager et al, PLB decreased CPOD patients' RR and according to Cabral, explained PLB reduced the dynamics of pulmonary infusion, increased SpO<sub>2</sub> and decreased the tolerance level of COPD patients towards daily activities.<sup>10</sup> Likewise with Dwi, explained the influence of decreasing congestion in COPD patients and according to Budiono, there are differences in oxygen saturation before and after pursed life breathing with a value of p-value 0000.<sup>13,14</sup> According to Mayer, PLB is effective in reducing ventilation and minute respiratory rate during exercise in patients with COPD.<sup>15</sup>

The purpose of the study was to study the effect of pursed lip breathing exercise on reducing the level of shortness of breath in chronic obstructive pulmonary disease at the West Sumatra Special Lung Hospital.

## METHODS

This research is a quantitative study using the quasy experiment design with the two group pretest and posttest design approach. The study was conducted at the West Sumatra Lung Hospital on May 1 to July 20 2019. The research was conducted on obstructive pulmonary disease patients in the Lung Hospital in West Sumatra with the intervention group of 16 respondents and 16 respondents control with the inclusion criteria of patients with a diagnosis of chronic obstructive pulmonary disease and aged 40-60 years with the exclusion criteria of patients with exacerbations or productive and purulent coughs.

**Table 4: Average decrease in shortness of breath in patients with chronic obstructive pulmonary disease in the control group.**

Variable	Mean	N
The mean decrease in shortness of breath in patients with COPD pre-test in the control group	3.19	16
The mean decrease in shortness of breath in post-COPD patients in the control group	2.56	

Data collection was done by using modified Medical Research Council tightness observation sheet.<sup>18</sup> Data is presented in tabular and narrative text using the t-independent statistical test.

## RESULTS

From Table 1, it can be seen that T is more than half (62.5%) of respondents are male, table 2 is more than half the age of 40-50 years old (56.3%), table 3 is more than half of senior high school education (65.6%). Table 4 shows that the mean lowered breathlessness in patients with COPD in the untreated control group pretest (3.19) and post-test average (2.56). Table 5 shows that the average decrease in the level of shortness of breath of the sufferers of COPD in the intervention group before lip breathing exercise (3.19) and average (1.69) after treatment. Table 6 above shows that the statistical test results with a p-value of 0.026 (p<0.05) means that there is an effect of the cursed lip breathing exercise on decreased shortness of breath in COPD patients in the polyclinic room at the Lung Hospital in West Sumatra.

**Table 1: Frequency distribution of respondent characteristic based on gender in the chronic obstruction lung disease sufferers in the intervention and control groups (n=32).**

Gender	f	%
Male	20	62.5
Female	12	37.5

**Table 2: Frequency distribution of respondent characteristic based on age in chronic obstructive pulmonary disease in the intervention and control groups (n=32).**

Age (in years)	f	%
40-50	18	56.3
51-60	14	43.7

**Table 3: Frequency distribution of respondent characteristic based on education level in chronic obstructive pulmonary disease patients in the intervention and control groups (n=32).**

Level of education	f	%
Junior high school	6	18.8
Senior high school	21	65.6
College	5	15.6

**Table 5: Average decrease in shortness of breath in patients with chronic obstructive pulmonary disease in the intervention group.**

Variable	Mean	N
The mean decrease in the level of breathlessness in patients with COPD before do pursed lip breathing exercise	3.19	16
The mean decrease in the level of breathlessness in patients with COPD after do pursed lip breathing exercise	1.69	

**Table 6: The effect of pursed lip breathing exercise on decreased breath shortness in chronic obstructive pulmonary disease patients in control and intervention groups.**

Variable	Mean	Elementary school	P value	N
The average reduction in breath rate in patients with COPD was pursed lip breathing exercise in the control and intervention groups	0.875	0.373	0.026	36

## DISCUSSION

The results of the study obtained the statistical test p value of 0.026 ( $p < 0.05$ ) which means that there is an influence of pursed lip breathing exercise on the reduction in the level of shortness of breath in patients with COPD in the polyclinic room, West Sumatra Lung in 2019. This study is in line with research conducted by Erma, that there is a difference between the average value of shortness of breath in the intervention group and the control group after pursed lip breathing exercise with a value of  $p = 0.000$  ( $p < 0.05$ ).<sup>16</sup> Laily revealed the same thing where based on the results of the study showed that the breathing pattern before pursed lip breathing exercise in the treatment group was 100% experiencing an ineffective breathing pattern with an average respiratory pattern of 6.2353, whereas after pursed lip breathing exercise is 8.7647. The statistical test results obtained p value 0.001 ( $\alpha = 0.05$ ) concluded that there was a significant effect of breathing patterns before and after pursed lip breathing exercise in the intervention group.<sup>17</sup> According to Faridah, the results of the study showed a significant difference between the average value of the intervention group and the control group with the value ( $p = 0.012$ ,  $\alpha = 0.05$ ).<sup>18</sup>

Pursed lip breathing exercise is a breathing exercise by breathing air through the nose and releasing air by means of the lips being tightened or squeezed to regulate the frequency and pattern of breathing so as to reduce air trapping, improve alveoli ventilation to improve gas exchange without increasing breathing work, regulating and coordinating respiratory rate so that breathing is more effective and reduces shortness of breath.<sup>6</sup>

The influence of pursed lip breathing exercise can reduce the level of shortness of breath in patients with COPD, because theoretically the mechanism of action of this exercise contracts the respiratory muscles optimally and involves the work of the diaphragm. In this exercise the diaphragm contracts to press the lungs to work effectively so that the pressure from the diaphragm can release air

that is retained in the alveoli due to reduced alveolar elasticity.<sup>19</sup>

Pursed lip breathing exercise, one of the breathing exercises used in pulmonary rehabilitation to reduce shortness of breath by means of relaxation, pursed lip breathing causes obstruction of exhalation air flow and increases air resistance, decreases transmural pressure gradients, and maintains patency of collapsed airways during exhalation. This process helps reduce trapped air expenditure so that it can control expiration and facilitate alveoli emptying optimally.<sup>20</sup> Pursed lip breathing exercise does not directly reduce the functional capacity of the residue, but improvement in shortness of breath is a result of the restoration of the diaphragm to the position of the thoracic contraction.<sup>19</sup>

Relaxation in muscles can reduce contractions, whereas relaxation in tendons can stimulate the Golgi body and have an impact on the inhibition of neurons that control muscle. This effect is often known as the inverse myotatic reflex, a relaxing technique that aims to relax the muscles of breathing aids, reduce the use of energy in breathing that can improve breathing work, also to reduce anxiety in people with COPD due to shortness of breath they experience.<sup>19</sup>

## CONCLUSION

There is an effect of pursed lip breathing exercise on reducing the level of shortness of breath in patients with COPD in the Lung Hospital of West Sumatra.

## ACKNOWLEDGEMENTS

Our gratitude goes to the West Sumatra Lung Hospital and all those who have helped carry out this research.

*Funding: Ministry of Research, Technology and Higher Education, Republic of Indonesia*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Morika HD, Sari IK, Sandra R, Arman E. The effect of pursed lip breathing exercise against decrease of breathing levels in chronic obstruction pulmonary disease. *Int J Community Med Public Health* 2019;6:4695-8.