

*Original article*

A Comparative Study of Balloon Blowing and Pursed-Lips Breathing Exercises on Oxygen Saturation Levels Among COPD Patients in the High Care Unit of Bali Mandara General Hospital

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Abstract

Introduction: COPD is a respiratory disease that causes chronic airflow disruption and progressive airway obstruction, as a result of many factors. COPD can occur due to decreased expiratory airflow due to increased airway resistance and decreased pulmonary elastic recoil. The management of COPD therapy is carried out with pharmacological and non-pharmacological therapies. Various non-pharmacological techniques can be performed, including Balloon Blowing and Pursed Lips Breathing (PLB). The number of COPD patients in the HCU room of Bali Mandara Hospital will fluctuate in 2024. A preliminary study in the HCU room of Bali Mandara Hospital in November 2024 found five COPD patients. The author is interested in comparing the administration of balloon blowing and pursed lips breathing exercises to the oxygen saturation level of COPD patients in the HCU Room of Bali Mandara Hospital.

Method: This study uses a quasi-experimental research method (Quasi Experimental Design) with the research design used is Nonequivalent Control Group Design. Where the experimental group and the control group were not randomly selected. The results of the comparative test analysis of balloon blowing and pursed lips breathing exercises on the oxygen saturation of COPD patients in the HCU Room of Bali Mandara Hospital using the results of the Repeated ANOVA test

Results: The results of the comparative test analysis of balloon blowing and pursed lips breathing exercises on the oxygen saturation of COPD patients in the HCU Room of Bali Mandara Hospital using the results of the Repeated ANOVA test obtained a p-value of 1,000 in the saturation before the intervention and a p-value of 0.304 in the column after the intervention, with a p value of > 0.05 , showing that there was no difference between balloon blowing and pursed lips breathing exercises on the oxygen saturation level in COPD patients because Both interventions have an effect on increasing oxygen saturation in COPD patients in the HCU Room of Bali Mandara Hospital

Conclusion: The results of this study are in line with a study that compared pursed lips breathing (PLB) and balloon blowing exercises to increase oxygen saturation in COPD patients, the results of which were no difference between PLB exercises and balloon blowing on oxygen saturation in COPD patients. There was an increase in clinical oxygen saturation due to the median value before the intervention: 94, however, there was no statistically significant improvement in the two interventions.

Protocol registration: This research has previously passed ethical review with the number: 012/EA/KEPK.RSBM.DISKES/2025

Keywords: Balloon Blowing, Chronic Obstructive Pulmonary Diseases, Pursed Lips Breathing, Oxygen Saturation

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is still a major global health problem. Based on Global Burden of Diseases data, in 2019, COPD was reported to have reached 212.3 million cases and accounted for around 3.2 million deaths worldwide. In 2021 and 2022, it is expected to remain the leading cause of deaths related to respiratory diseases (Global Burden Disease, 2021). The prevalence of COPD in the Asian continent varies between countries. The prevalence of COPD in Asian countries is estimated at 6.3% with the highest prevalence in Vietnam (6.7%) and China (6.5%) (Oemiati, 2020). The incidence of COPD in Indonesia accounted for 3.7%, with the highest prevalence of 10.0% in East Nusa Tenggara and in Bali at 3.5%. Based on SIMRS data from Bali Mandara Hospital, there were 129 patients treated with a medical diagnosis of COPD in the 2023-November 2024 time period, where several cases were found to be recurring.

In the findings of this case, it was found that the male gender experienced the most COPD, which was 83 patients and was aged 70 years and above..

COPD is a respiratory disease that causes chronic airflow disruption and progressive airway obstruction, as a result of many factors. COPD can occur due to decreased expiratory airflow due to increased airway resistance and decreased recoil lung elasticity. The management of COPD therapy is carried out with pharmacological and non-pharmacological therapies. Various non-pharmacological techniques can be performed, including Balloon Blowing and Pursed Lips Breathing (PLB). Balloon blowing by blowing a balloon that helps the intracosta muscles elevate the diaphragm and costal muscles. This allows the lungs to absorb oxygen, altering the existing material and removing carbon dioxide in the lungs (PDPI, 2023). Blowing balloons is very effective to help the lungs expand so that it is able to supply oxygen and remove carbon dioxide trapped in the lungs. Increased ventilation of the alveoli can increase oxygen supply, so it can be used as a therapy to increase oxygen saturation (Suharno et al., 2020).

Meanwhile, Pursed Lips Breathing is a breathing technique that involves exhaling slowly through tight lips, which can help reduce shortness of breath, increase the alveolar capacity for gas exchange, reduce the load on the respiratory muscles and increase oxygen saturation (Endrianti et al., 2021).

The number of COPD patients in the HCU room of Bali Mandara Hospital will fluctuate in 2024. A preliminary study in the HCU room of Bali Mandara Hospital in November 2024 found five COPD patients. During the treatment period, the management of the therapy provided was pharmacological therapy, deep breathing relaxation therapy and the granting of a semifowler position.

The research was conducted in the High Care Unit (HCU) room because most similar research was conducted in outpatient units or ordinary wards. HCU patients usually have more severe patient conditions and have not been explored much. A comparative study between these two techniques at HCU Bali Mandara Hospital will provide deeper insight into the conservative management that can be done to improve the oxygenation level of COPD patients. This is important, given that improving the quality of life of COPD patients and preventing further exacerbations can contribute to a reduction in mortality rates and COPD-related complications. Based on the introduction, the author is interested in comparing the administration of balloon blowing and pursed lips breathing exercises to the oxygen saturation level of COPD patients in the HCU Room of Bali Mandara Hospital.

METHOD

This study uses a quasi-experimental research method (Quasi Experimental Design) with the research design used is Nonequivalent Control Group Design. Where the experimental group and the control group were not randomly selected (Nursalam, 2020). The experimental and control groups were subjected to preliminary tests. The two groups received different treatments, where the experimental group was given the Balloon Blowing Treatment and the control group was given the Pursed Lips Breathing Exercise and ended with the final test for each group.

RESULTS

The results of the comparison of balloon blowing and pursed lips breathing exercises on the oxygen saturation level of COPD patients are shown in the following table:

Table 1. Comparison Table of Balloon Blowing and Pursed Lips Breathing Exercises on the Oxygen Saturation Level of COPD Patients in the HCU Room of Bali Mandara Hospital

Perbandingan Pemberian <i>Balloon Blowing</i> dan <i>Pursed Lips Breathing</i>	<i>p</i>
Sebelum Intervensi	1,000 $p > 0,05$
Setelah Intervensi	0,304 $p > 0,05$

The results of the comparative test analysis of balloon blowing and pursed lips breathing exercises on the oxygen saturation of COPD patients in the HCU Room of Bali Mandara Hospital using the results of the Repeated ANOVA test obtained a p-value of 1,000 in the saturation before the intervention and a p-value of 0.304 in the column after the intervention, with a p value of > 0.05 , showing that there was no difference between balloon blowing and pursed lips breathing exercises on the oxygen saturation level in COPD patients because Both interventions were equally influential in increasing oxygen saturation in COPD patients in the HCU Room of Bali Mandara Hospital. So there is no difference in the provision of the two interventions.

DISCUSSION

The results of this study are in line with a study that compared pursed lips breathing (PLB) and balloon blowing exercises to increase oxygen saturation in COPD patients, the results of which were no difference between PLB exercises and balloon blowing on oxygen saturation in COPD patients. There was an increase in clinical oxygen saturation due to the median value before the intervention: 94, however, there was no statistically significant improvement in the two interventions. On the third and seventh days there was no statistically significant difference and after blowing the balloon (median = 96) and PLB (median = 96), for the seventh day of blowing the balloon and PLB (median = 99), the value of $p > 0.181$ (Junaidin & Sartika, 2022). There is no difference that makes one dominant (Junaidin et al., 2022), both pursed lips breathing and balloon blowing because both exercises are able to train the strength of the respiratory muscles, especially the intercostal muscles which play a role in increasing the rate of breathing, especially in balloon blowing exercises. Both breathing exercises emphasize expiratory muscle exercises to extend exhalation time and increase airway pressure when exhaling, thereby reducing water trapping. This can increase oxygen levels in the lungs to the maximum, so that oxygen saturation in the blood increases (PDPI, 2023). Improved performance of the intercostal muscles responsible for the development of respiratory expansion, lifting the diaphragm and ribs will allow the diffusion of oxygen during inspiration and the release of carbon dioxide during expiration (Fernandes & Chougule, 2017), Both exercises are effective in helping lung expansion so that it is able to supply oxygen and remove carbon dioxide trapped in the lungs in patients with impaired respiratory function (Astriani et al., 2020). These two breathing techniques are able to train the respiratory muscles, especially the intercostal muscles, prolong exhalation time, and increase airway pressure during expiration. This contributes to a decrease in water trapping and an increase in oxygen diffusion in the alveoli. Both of these breathing exercises can be given to patients with COPD, especially those treated in the HCU room. Both of these exercises are easy, inexpensive, non-invasive, and non-pharmacological methods that can be considered as in improving oxygenation status and physiological indicators in COPD patients. Thus, nurses are encouraged to provide pursed lips breathing and balloon blowing exercises to help increase the oxygen saturation of patients with COPD.

CONCLUSION

The results of the comparative test analysis of balloon blowing and pursed lips breathing exercises on the oxygen saturation of COPD patients in the HCU Room of Bali Mandara Hospital using the results of the Repeated ANOVA test obtained a p-value of 1,000 in the saturation before the intervention and a p-value of 0.304 in the column after the intervention, with a p value of > 0.05 , showing that there was no difference between balloon blowing and pursed lips breathing exercises on the oxygen saturation level in COPD patients because both interventions were equally influential in increasing oxygen saturation in COPD patients in the HCU Room of Bali Mandara Hospital. So there is no difference in the provision of the two interventions.

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