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Breathe Better: The Role of Pursed Lips Breathing Therapy in Chronic Bronchitis Patients

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ABSTRACT

Chronic bronchitis is an inflammatory disease of the bronchial respiratory tract that lasts more than 3 months or several times in 2 years. Symptoms in patients with chronic bronchitis can affect breathing patterns, including dyspnea, respiratory frequency, depth of breathing, and oxygen saturation. Providing Pursed Lip Breathing therapy can create resistance to the air coming out of the lungs and open the airways to improve breathing patterns. This study aimed to analyze the effectiveness of Pursed Lip Breathing therapy on breathing patterns in patients with chronic bronchitis. This descriptive, experimental research was conducted on a Chronic Bronchitis patient. Patient in the Inpatient Room of a government hospital. The implementation of Pursed Lip Breathing therapy was carried out for 4 days, where each day, there was one session of 8-10 repetitions of abdominal breathing followed by Pursed Lip Breathing therapy for 8 minutes. Data analysis was explained descriptively daily to compare the improvement in breathing patterns between pre and post-therapy values. The study results showed significant improvement in breathing patterns, including the level of dyspnea, depth of breathing, orthopnea, use of accessory muscles for breathing, and vital signs, including RR, SPO2, and the patient's blood pressure. This study concluded that Pursed Lip Breathing therapy effectively improved breathing patterns in Chronic Bronchitis patients. The results of this study indicate that pursed lip breathing therapy is safe to apply to patients undergoing treatment. Nurses can apply pursed lip breathing therapy and implement Indonesian Nursing Intervention Standards for patients with breathing pattern disorders.

Keywords: Breathing Patterns, Dyspnea, Pursed Lip Breathing, Chronic bronchitis

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1. INTRODUCTION

Chronic bronchitis is an inflammatory disease of the bronchial respiratory tract that lasts more than 3 months or several times in 2 years (Kızılırmak & Yorgancıoğlu, 2023). The

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cause of chronic bronchitis is viral or bacterial infections, which can be triggered through unclean environments and unhealthy lifestyles (Riyadi, 2019). As a result, the symptoms that appear in chronic bronchitis are cough with phlegm, additional wheezing breath sounds, chest pain, shortness of breath, cyanosis, and easy fatigue (Pearce, 2022). According to the 2018 Basic Health Research (RISKESDAS) data, the percentage of COPD in Indonesia reached 3.7% of the population. There are 508,330 cases of COPD in the age group 30 years and over in Indonesia. In the general population, the percentage of chronic bronchitis ranges from 3% to 7% among healthy adults (Amin et al., 2023). World Health Organization (WHO) data shows that in 2021, in the ASEAN region, Thailand showed the highest number of chronic bronchitis cases, reaching 2,885,561 people from the population (WHO, 2022). In Indonesia, as of 2015, there were 1.6 million people infected with bronchitis (Kharis et al., 2019).

Patients with chronic bronchitis experience inflammation in the bronchial respiratory tract, causing problems in inhibiting alveolar macrophage cells and causing goblet cell hyperplasia (Kim et al., 2021). The consequences in this case are excessive mucus production along the airway and enlargement of the bronchi, which results in airway obstruction, especially during expiration. If this continues, the airway will collapse, so air is trapped in the distal part of the lung, and ventilation in the alveoli decreases. Decreased alveolar ventilation causes a decrease in PO_2, so the patient appears cyanotic (Oktaviani & Adi Nugroho, 2022). Treatment that patients with chronic bronchitis can carry out besides providing oxygen is through breathing exercises (Shafiq et al., 2022).

Pursed Lips Breathing therapy can be applied routinely to reduce obstruction and shortness of breath (Shafiq et al., 2022). This technique creates air resistance when expelling it from the lungs by closing the lips half-closed (Rahma et al., 2023). This increases the pressure in the bronchi, which reduces the chance of the narrow airway collapsing. The positive pressure created helps maintain the patency of narrowed airways, allowing air to escape more efficiently. The respiratory muscles can work more effectively by keeping the airway open, reducing shortness of breath, and decreasing breathing frequency. (Mendes et al., 2019).

Based on this background, the researchers were interested in researching the effectiveness of Pursed Lips Breathing Therapy on breathing patterns in patients

with chronic bronchitis in the Inpatient Room of a Government Hospital. This research will discuss the development and progress of treating ineffective breathing patterns in a Patient 63 years old with Obs. Dyspnea et cause COPD Chronic Bronchitis + Sinistra Pleural Effusion + Hyperglycemia. The patient's family said that the patient complained of shortness of breath after driving a truck at night on 06-07-2024. The patient said that he could not sleep that night because it was difficult to breathe. The family took the patient to the Community Health Center on 06-08-2024 at 07.00 am. The patient was referred to the Emergency Room of a Government Hospital with the main complaint of shortness of breath. The patient was taken to the emergency room and showed moderate general condition assessment results, GCS: E4, V5, M6, blood pressure: 90/60 mmHg, Pulse: 102 per minute, RR: 40 per minute, SPO_2: 90%, T: 36, 3°C, RBG: 214 gr/dL, dyspnea (+), rhonchi (-), wheezing (+/+), flat abdomen, bowel sounds (+), warm, dry extremities and edema (-). The patient received treatment in the emergency room, including administration of NRM oxygen at 10 pm, rehydration of 0.9% NaCl 500 cc finished in 30 minutes followed by 21 dpm, nebula combivent+pulmicort every 12 hours, and injection of santagesik 1 gr, ondansetron 4 mg, and cefixime tablets. After stabilizing the BP after rehydration, namely blood pressure: 90/60 mmHg, Pulse: 97 per minute, RR: 34 times/minute, SPO_2: 99%, the patient was transferred and treated to the Inpatient Room.

2. METHODS

This research design is a case study with an observational, experimental approach in the Anthurium Room, dr. Soebandi Hospital Jember. The subjects of this research met the inclusion and exclusion criteria. The inclusion criteria include: 1) COPD sufferers in stage 2 or 3 treated in the Anthurium Room, dr. Soebandi Hospital Jember; 2) Aged 40-65 years; 3) Willing to be a research respondent. Exclusion criteria include: 1) Patients with neurological disorders; 2) Patients who are not cooperative in following instructions. The research subjects were selected in June, and Mr. M meets the research criteria.

Data collection was carried out during pre and post-therapy in the form of breathing patterns according to the "Indonesian Nursing Outcome Standards" (SLKI) indicators and vital signs, including blood pressure, RR, and SPO_2. At meetings with patients, researchers explain the research aims, objectives, benefits, and procedures. The researcher asked for

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approval to participate in the research by reading and signing the informed consent form as proof of willingness to guarantee the confidentiality of the data obtained. The thing that must be done before administering Pursed Lip Breathing therapy is to ensure that the patient is in a stable condition and can provide oxygenation assistance during the 10-minute therapy. Ensure that before administering Pursed Lip Breathing therapy, the patient does not take medication or nebulization that affects post-therapy results. Treatment and nebulization can be done after administering Pursed Lip Breathing therapy or waiting at least 30 minutes after administering medication or nebulization.

Pursed Lip Breathing therapy is carried out for 4 days, with one session each day at the same time. The intervention started with abdominal breathing for 8-10 breaths and then continued with Pursed Lip Breathing therapy for 8 minutes. The researcher first demonstrated and trained the patient on correct abdominal breathing and pursed lip breathing therapy. Once the patient gets used to it, the implementation session begins until the emphasized time. Researchers explained that patients can independently repeat pursed lip breathing therapy when they are short of breath.

The results of this research, through patient breathing pattern data, are presented in a categorical form where the higher the score indicates, the more significant the improvement. In contrast, the patient's RR, SPO_2, and blood pressure are presented numerically. The data results were analyzed using descriptive analysis to describe chronic bronchitis patients' breathing patterns, RR, SPO_2, and blood pressure before and after the Pursed Lip Breathing therapy intervention. The analysis was done daily for 4 days by comparing the patient's breathing pattern and vital signs values before and after the Pursed Lip Breathing therapy intervention to see any improvement.

3. RESULTS

Based on major and minor data findings, nursing diagnoses were made on June 10, 2024, including ineffective breathing patterns, unstable blood glucose levels, activity intolerance, risk of falls, and impaired comfort. Pursed Lip Breathing Therapy intervention is given to overcome the problem of ineffective breathing patterns for 4 days from 10 to June 13, 2024, every time at 15.00 WIB. The patient underwent other nursing procedures besides pursed-lip breathing therapy, including oxygenation via a 4 pm nasal cannula, 3x1 pulmicort nebulization, and

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3x1 Combivent. Based on the description of the results of implementing pursed lip breathing therapy every day for 4 days, changes in the patient's breathing pattern can be summarized in the table 1.

Table 1. Results of Implementing Pursed Lip Breathing Therapy on Breathing Patterns

Indicator	Breathing Pattern Score							
	Day-1		Day-2		Day-3		Day-4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Dyspnea	1	2	2	2	2	3	3	4
Use of accessory muscles to breathe	2	2	2	3	3	4	4	5
Orthopnea	1	2	2	2	2	3	3	4
Respiratory frequency	1	2	2	2	2	3	3	4
Depth of breath	2	2	2	3	3	4	4	5

Table 1 shows significant changes have led to improvements in the patient's breathing patterns every day for 4 days undergoing pursed lip breathing therapy. The changes in the table in each breathing pattern indicator appear to increase and end at a score of 4 or 5, which interprets the results as improving. Apart from that, the results of implementing pursed lip breathing therapy every day for 4 days are summarized by changes in the patient's vital signs in the graph below.

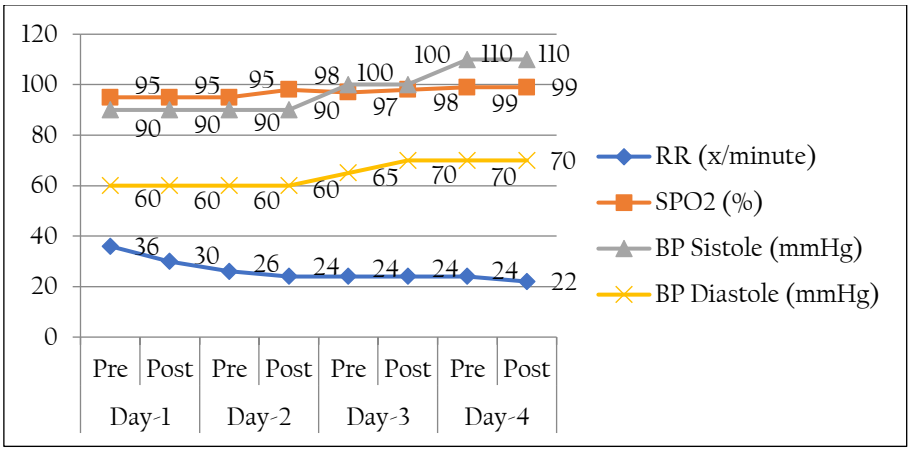

Figure 1. Results of Implementing Pursed Lip Breathing Therapy on Vital Signs

Figure 1 shows significant changes leading to improvements in the patient's vital signs daily during the 4 days of pursed lip breathing therapy. The fluctuations seen on the graph for each indicator consistently approach regular numbers, which interprets improving results.

4. DISCUSSION

Based on the results of the summative evaluation during the 4 days of implementation, no differences were found between theory and previous research results. The results of the research above show that the 4-day pursed lip breathing

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therapy intervention given to the Patient, 63 years old, with chronic bronchitis, showed improvements in the Patient's breathing pattern and vital signs, including RR, SPO_2, and blood pressure. The results of this study are in line with the results of research conducted by (Shafiq et al., 2022), showing that 8 minutes of pursed lip breathing therapy intervention in 15 COPD patients in the intervention group can improve breathing patterns and lung function testing in both rest and activity conditions compared to the group control. Another study by (Lalwani et al., 2020) also confirmed this research, showing that the intervention of pursed lip breathing therapy 3 cycles for 6 days in 56 stable COPD patients significantly improved oxygen saturation and dyspnea levels. Therefore, pursed lip breathing therapy can be a non-pharmacological treatment for treating shortness of breath in COPD patients.

From the results of this study, the Patient's level of dyspnea decreased from the score before therapy on the first day, namely 1 (immensely increased), after 4 days of pursed lip breathing therapy to a score of 4 (immensely decreased). In addition, shortness of breath in the supine position or orthopnea on the first day before therapy at score 1 (entirely improved) can decrease to score 4 (immensely decreased) after 4 days of pursed lip breathing therapy. This is because, through pursed lip breathing therapy, the air is expelled through narrow lips, causing pressure in the oral cavity to spread to the airways and lungs. This pressure opens the airways and releases air trapped in the lungs (Rahma et al., 2023). Therefore, the Patient's shortness of breath can decrease as they undergo pursed lip breathing therapy.

The results of this study show that the use of the Patient's accessory respiratory muscles, namely the sternocleidomastoid, on the first day before therapy at a score of 2 (immensely increased) can decrease to a score of 5 (decreased) after 4 days of pursed lip breathing therapy. Decreased breathing ability can result in muscle contractions in the chest to help breathing (Patel et al., 2022). Through pursed lip breathing therapy over time, the Patient's airway can be opened, making the Patient's ability to breathe easier.

The results of this study show that the Patient's respiratory frequency on the first day before therapy at score 1 (worsened) decreased to score 4 (somewhat improved) after 4 days of pursed lip breathing therapy. This is proven by the improvement in the number of RRs from the first day, namely 36 per

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minute, after undergoing 4 days of pursed lip breathing therapy to 24 per minute. Pursed lip breathing therapy will pressure the entire respiratory system, from the mouth and airways to the alveoli to open the airway, and the residual air in the lungs can be expelled (Sulistyanto et al., 2023). Ease of breathing increases oxygen adequacy so that the Patient's breathing rate gradually returns to normal. Therefore, the Patient's respiratory frequency improved after 4 days of pursed lip breathing therapy because the Patient's breathing ability also improved.

According to the results of this study, the depth of breathing had improved, where the initial score before therapy was 2 (quite worse), and after 4 days of pursed lip breathing therapy, it became a score of 5 (improved). Before undergoing therapy, the Patient appeared to have a shallow and rapid breathing pattern that made him appear restless and had difficulty breathing. As the days of applying therapy progressed, the Patient improved the tachypnea breathing pattern, which gradually decreased. Through pursed lip breathing therapy, residual air trapped in the alveoli can be helped to come out so that the expansion of the chest in breathing becomes wider (Lalwani et al., 2020). Adequate space in the lungs when breathing helps improve the depth of breathing from shallow to normal.

The results of this study show that the Patient's oxygen saturation increased. In contrast, before undergoing therapy on the first day, the oxygen saturation was 95% without an oxygen tube and 99% after 4 days of pursed lip breathing therapy. An increase in oxygen saturation indicates that the sufficiency of oxygen in the blood is improving. Lack of sufficient oxygen in the blood before therapy results from difficulties in the Patient's ability to breathe, so the oxygen saturation is low. Pursed lip breathing therapy helps widen the airway, making it easier for patients to breathe (Shafiq et al., 2022). For this reason, maximum air can enter the lungs and increase oxygen saturation.

The results of this study showed that the Patient's blood pressure improved from before therapy, namely 90/60 mmHg to 110/70 mmHg, after 4 days of pursed lip breathing therapy. Changes in blood pressure fluctuations can be influenced by breathing through breathing frequency and patterns (Sakhaei et al., 2018). Through pursed lip breathing therapy, patients can improve the frequency and pattern of breathing, thereby helping to improve blood pressure.

The results of this study cannot be separated from the influence of

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confounding factors on the effectiveness of pursed lip breathing therapy for the Patient. During his treatment at the hospital, the Patient received 3x1 pulmicort, 3x1 combivent nebulization treatment, and 4 liter per minute nasal cannula oxygenation. Administering nebulization to the Patient helps dilate the bronchi and reduce lung inflammation, thereby reducing the tightness felt. Apart from that, providing oxygenation helps support the Patient's oxygen needs, thereby improving the Patient's oxygen saturation. Therefore, improvements in the Patient's breathing pattern and vital signs, apart from the effects of pursed lip breathing therapy, are also influenced by the nebulization and oxygenation treatment given.

Based on research by (Lestari et al., 2018) shows that administering nebulization therapy with Combivent reduces the average respiratory frequency of patients with dyspnea from 34.7 to 28.7 (p-value < 0.001). This research shows the effectiveness of combivent nebulization in reducing respiration by up to ± 6. This study showed that the results of implementing pursed lip breathing therapy for 4 days in chronic bronchitis patients reduced respiratory frequency to 14 respirations/minute. Thus, the use of non-pharmacological therapy still requires assistance from conservative management to support maximum improvement in the Patient's breathing pattern.

5. CONCLUSION

Based on the results of the assessment of the Patient with Chronic Bronchitis, the patient had complaints of shortness of breath, which showed use of the sternocleidomastoid accessory respiratory muscles, breathing appeared shallow and rapid, and vital signs showed RR: 36 per minute, BP: 90/60 mmHg, SPO_2: 95%. The results of the data analysis showed that the patient's nursing problem was ineffective breathing patterns. Nursing interventions are prepared based on the Indonesian Nursing Intervention Standards: airway management with non-pharmacological therapy in pursed lip breathing therapy. Implementation of airway management nursing and pursed lip breathing therapy was carried out for 4 days, where pursed lip breathing therapy was carried out one cycle per day at 15.00 WIB by assessing the patient's breathing pattern and vital signs pre and post-therapy. The intervention results showed that pursed lip breathing therapy significantly improved the patient's breathing pattern and vital signs. A nursing evaluation of the patient after 4 days of treatment showed that the nursing

problem of breathing patterns was not effectively resolved.

Pursed lip breathing therapy can be carried out with independent monitoring from the family to reduce shortness of breath in patients with respiratory disorders.

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AUTHOR CONTRIBUTIONS

Adinda Widia Pangestu was responsible for conceptualization, methodology, formal analysis, original draft writing, supervision, and project administration. Jon Hafan Sutawardana contributed to data curation, article screening, data extraction, manuscript review and editing, and visualization. Murtaqib worked on methodology, formal analysis, manuscript review and editing, and visualization. Mustakim contributed to data curation, manuscript review and editing, and visualization.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available upon reasonable request from the corresponding author.

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