Application of Semi-Fowler Position and Pursed Lip Breathing in Pulmonary Tuberculosis Patients with Inefective Breathing Pattern Problems in the Mawar Room, Rsud X

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Pulmonary Tuberculosis remains a significant health problem and is often associated with respiratory complications such as ineffective breathing patterns. This case study aimed to describe the effectiveness of non-pharmacological nursing interventions, namely the Semi- Fowler position and Pursed-Lip Breathing exercises, in improving breathing patterns in patients with Pulmonary Tuberculosis. A descriptive case study design was applied to three patients treated in the Mawar Ward of RSUD X. Data were collected through interviews, observation, physical examination, and documentation over a three- day intervention period. Outcomes were evaluated based on respiratory rate, oxygen saturation, use of accessory respiratory muscles, chest wall retraction, and subjective dyspnea. The results showed a decrease in respiratory rate from 26–28 to 20–21 breaths per minute and an increase in oxygen saturation from 94–95% to 99%, accompanied by reduced dyspnea and improved breathing patterns. These findings indicate that the Semi-Fowler position combined with Pursed-Lip Breathing is effective in improving respiratory function in patients with Pulmonary Tuberculosis.

Keywords: Pulmonary Tuberculosis, Ineffective breathing pattern, Semi-Fowler position, Pursed- Lip Breathing

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1. Introduction

One of the infectious diseases that remains a major public health problem is Tuberculosis (TB), particularly Pulmonary Tuberculosis. At present, this disease continues to be a significant health issue in Indonesia and requires serious attention. Tuberculosis is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. It is transmitted through the air via droplet nuclei expelled by infected individuals. The main symptom of pulmonary tuberculosis is a persistent cough lasting two weeks or more, often accompanied by other symptoms such as productive cough, blood-streaked sputum, shortness of breath, general weakness, decreased appetite and weight loss, night sweats without physical activity, and prolonged fever lasting more than one month [1].

According to the World Health Organization (WHO), the global prevalence of tuberculosis has increased, rising from 6,116,536 cases in 2018 to 10,400,000 cases in 2019. Indonesia ranks third in the number of TB cases, with approximately 845,000 cases and 98,000 deaths, following India and China, and followed by Nigeria, Pakistan, and South Africa [2]. WHO reports that the high incidence of TB is influenced by unhealthy behaviors and habits, such as not covering the mouth and nose when coughing or sneezing, improper disposal of sputum, and failure to wear masks in public places.

According to the Indonesian Ministry of Health (2021), the incidence rate of tuberculosis in Indonesia reached 0.42%, with a total of 1,017,290 cases. The highest number of cases was reported in West Java

(186,809 cases), followed by East Java (151,878 cases), Central Java (132,565 cases), North Sumatra (55,351 cases), Banten (48,621 cases), and DKI Jakarta (40,210 cases). Meanwhile, South Sulawesi ranked seventh with a TB incidence rate of 0.36% or 33,693 cases [3]. Based on the Central Java Health Profile in 2021, the incidence of tuberculosis in the province in 2020 was recorded at 2,261 per 100,000 population. The tuberculosis case notification rate (CNR) in 2021 reached 110 per 100,000 population, slightly decreasing compared to 113 per 100,000 population in 2020. The distribution of tuberculosis cases in Central Java shows considerable variation among districts and cities [4].

Tuberculosis cases in Semarang City have not decreased significantly. Based on data from the Semarang City Health Office, there were 3,749 recorded TB cases in 2022 [5]. Direct data from RSUD Xin March 2022 indicated that in 2021 there were 125 cases of pulmonary tuberculosis in Semarang City. Based on gender, male patients accounted for the majority with 72 cases (58%), while female patients numbered 53 cases (42%). In terms of age groups, pulmonary TB cases included 18 cases (14%) among infants aged 0–1 year, 22 cases (18%) among children aged 2–10 years, 7 cases (6%) among adolescents aged 11–19 years, 62 cases (50%) among adults aged 20– 60 years, and 16 cases (13%) among elderly individuals over 60 years of age [6].

According to WHO (2022), tuberculosis remains one of the leading causes of death among infectious diseases worldwide. The management of this disease includes two main aspects: medical treatment and nursing care. The World Health Organization has developed a tuberculosis control strategy known as DOTS (Directly Observed Treatment, Short- course). The DOTS strategy is essential to prevent drug resistance and ensure effective TB treatment. Continuous monitoring and evaluation of the implementation of pulmonary TB therapy using the DOTS strategy are necessary. Monitoring and evaluation are critical components of management, as they help assess whether TB control strategies are being successfully implemented [7].

Tuberculosis is a chronic disease that requires long-term care. Common signs and symptoms include unexplained continuous weight loss for more than three months, persistent fever lasting over one month, cough lasting more than two weeks, chest pain, shortness of breath, decreased appetite, easy fatigue, and night sweats without physical activity [8]. These symptoms occur due to infection by Mycobacterium tuberculosis, which attacks the lower respiratory tract, disrupts the respiratory system, and leads to breathing difficulties [9].

If pulmonary tuberculosis does not receive proper treatment, it can lead to serious complications. One possible complication is massive hemoptysis, which is bleeding from the lower respiratory tract that can potentially cause death due to hypovolemic shock or airway obstruction [10]. Other complications may include lobar collapse due to bronchial retraction, bronchiectasis (localized bronchial dilation), fibrosis (formation of connective tissue in the pleura), spontaneous lung collapse due to tissue damage, and dissemination of infection to other organs such as the brain, bones, and kidneys [11].

Considering these potential complications, nursing care plays a crucial role as a preventive measure to prevent and manage emerging nursing problems, one of which is ineffective breathing patterns caused by inadequate inspiration and expiration that fail to provide sufficient ventilation. Non-pharmacological approaches play an important role in managing dyspnea in patients with pulmonary tuberculosis, where nurses actively provide direct care at various levels of health services to help patients meet their oxygen needs. One intervention that can be applied to reduce shortness of breath is pursed-lip breathing exercises, which help slow the respiratory rate, improve breathing efficiency, and maintain positive airway pressure to optimize gas exchange [11].

According [12], pursed-lip breathing is an effective breathing technique aimed at helping the body obtain oxygen optimally. This exercise involves prolonging the exhalation phase of breathing. The purpose is to allow the airways in the lungs to remain open longer, thereby relieving shortness of breath [13]. Research conducted by [10]also demonstrated a significant effect of pursed-lip breathing techniques before and after the intervention. Based on a case study conducted in the Amarilis Ward of RSUD Dr. Gondo Suwarno Ungaran, Semarang, this therapy, administered for three consecutive days, was proven to reduce respiratory rate to within normal limits and increase oxygen saturation to normal levels.

In addition, the semi-Fowler position also plays an important role in improving oxygenation. This position allows the lungs to expand more optimally, thereby reducing dyspnea. Furthermore, the semi-Fowler position helps reduce abdominal pressure on the diaphragm, utilizes gravity to improve ventilation, and decreases the use of accessory respiratory muscles [14]. As a result, damage to the alveolar membrane due to fluid accumulation can be minimized, shortness of breath is reduced, and the patien's recovery process can proceed more rapidly [15].

2. Literature Review and Problem Statement

Pulmonary tuberculosis (TB) is a communicable infectious disease caused by *Mycobacterium tuberculosis* that primarily affects lung tissue and is transmitted through airborne droplets released by individuals with smear-positive TB. Once inhaled, the bacteria reach the alveoli and trigger a chronic inflammatory process that may progress to latent or active TB depending on the individual's immune status. Clinically, TB is classified into pulmonary TB (smear-positive and smear-negative) and extrapulmonary TB with mild to severe manifestations, while patient types are determined based on treatment history, including new cases, relapse, transfer-in, and treatment default. Common clinical manifestations include chronic cough, prolonged fever, dyspnea, chest pain, and systemic symptoms such as weight loss and night sweats. Only about 10% of infected individuals develop active TB, while the majority remain in a latent, asymptomatic phase [16], [17], [18]

The management of tuberculosis requires long-term therapy lasting 6–8 months, consisting of an intensive phase followed by a continuation phase using a combination of anti-tuberculosis drugs to eradicate bacteria, prevent drug resistance, relapse, and disease transmission. In nursing practice, care focuses on comprehensive assessment of the respiratory system and other body systems, establishment of nursing diagnoses such as ineffective breathing pattern, ineffective airway clearance, impaired gas exchange, and nausea, and implementation of nursing interventions based on SDKI, SLKI, and SIKI standards. Non-pharmacological interventions, including the semi-Fowler position and pursed-lip breathing technique, have been shown to improve ventilation, reduce dyspnea, and enhance gas exchange. Nursing evaluation is conducted continuously using the SOAP method to assess goal achievement and determine further nursing care actions [12].

Based on the literature review and the research gap related to non-pharmacological treatment in pulmonary tuberculosis patients, especially in addressing the problem of ineffective breathing patterns, a more applicable study in clinical practice is needed. The semi-Fowler position is known and the pursed lip breathing technique has the potential to increase pulmonary ventilation and reduce shortness of breath, but its application in pulmonary tuberculosis patients still needs to be described systematically. Therefore, the problem formulation in this article is "How is the application of the semi-Fowler position and pursed lip breathing in pulmonary tuberculosis patients with ineffective breathing patterns in the Mawar Ward of RSUD X?"

3. Methods

The research method used in this final scientific paper is a descriptive case study. A case study is a research method conducted in depth on an individual or a specific situation to obtain a comprehensive understanding of health problems and the implementation of nursing care. A descriptive case study design was selected because it is appropriate for describing the application of non-pharmacological nursing interventions in the form of the semi-Fowler position and the pursed-lip breathing technique in patients with Pulmonary Tuberculosis experiencing ineffective breathing patterns. This case study was conducted in the Mawar Ward of RSUD X. The subjects of the study were patients with Pulmonary Tuberculosis who were hospitalized in the ward and experienced ineffective breathing patterns. Subject selection was based on inclusion and exclusion criteria. The inclusion criteria included patients diagnosed with Pulmonary Tuberculosis, experiencing dry cough, being fully conscious (compos mentis), able to communicate effectively, and willing to participate as case study subjects. The exclusion criteria included patients with decreased levels of consciousness, severe complications, severe comorbidities affecting the respiratory system, and patients who were uncooperative.

The main focus of this case study was the implementation of non-pharmacological nursing interventions, namely the semi-Fowler position and the pursed-lip breathing technique, to address ineffective breathing patterns in patients with Pulmonary Tuberculosis. The instruments used in this case study included a nursing assessment format, observation sheets for vital signs such as respiratory rate and oxygen saturation, as well as the Indonesian Nursing Diagnosis Standards, Indonesian Nursing Outcome Standards, and Indonesian Nursing Intervention Standards. Nursing evaluation sheets using the SOAP approach were also utilized. Data collection methods included direct interviews with patients and their families to obtain subjective data related to chief complaints and health history, direct observation of the patients condition, particularly breathing patterns, use of accessory muscles, respiratory rate, and level of dyspnea, systematic physical examination using the B1–B6 approach, and documentation review from medical records, nursing notes, and relevant supporting examination results.

This case study was conducted in the Mawar Ward of RSUD X, with data collection carried out in August 2025. Data were collected for a minimum of two days of patient care. Data analysis was performed descriptively by comparing the responses of three patients after the nursing care interventions were implemented. The results were presented in narrative form based on the stages of the nursing process, including assessment, diagnosis, intervention planning, implementation, and evaluation. Ethical principles were applied throughout the study. Informed consent was obtained from patients prior to the implementation of nursing interventions. Confidentiality was maintained by protecting patient information, and anonymity was ensured by not using patients real names and instead applying initials to safeguard patient privacy in the case study report.

4. Results And Discussion

Case Study Results

This case study aimed to describe the responses of patients with Pulmonary Tuberculosis who experienced ineffective breathing patterns after receiving non- pharmacological nursing interventions in the form of the semi-Fowler position and pursed- lip breathing technique. The case study was conducted on three patients hospitalized in the Mawar Ward of RSUD X, over a three-day period of care. The evaluated parameters included respiratory rate, oxygen saturation (SpO_2), use of accessory respiratory muscles, chest wall retraction, and subjective complaints of dyspnea. Initial findings showed that all patients experienced

increased respiratory rates above normal limits, use of accessory muscles, and shortness of breath that interfered with comfort and daily activities.

Case Patient I involved Mr. A, a 67-year-old male diagnosed with active Pulmonary Tuberculosis. Initial assessment on August 5, 2025 revealed complaints of shortness of breath, especially during light activity, with a respiratory rate of 27 breaths per minute and SpO_2 of 95%, accompanied by the use of accessory respiratory muscles and fine crackles on auscultation. After the implementation of the semi-Fowler position and pursed-lip breathing exercises, the patient showed a gradual improvement. By the third day, the respiratory rate decreased to 21 breaths per minute and SpO_2 increased to 99%. The patient appeared more comfortable, reported reduced anxiety, and was able to perform breathing exercises independently.

Case Patient II involved Mr. N, a 46-year-old male with chronic active Pulmonary Tuberculosis accompanied by left pleural effusion. On initial assessment dated August 13, 2025, the patient complained of dyspnea, productive cough, and chest heaviness, with a respiratory rate of 28 breaths per minute and SpO_2 of 94%, along with obvious use of accessory respiratory muscles. Following the nursing interventions, thepatients respiratory condition improved progressively. On the third day of care, the respiratory rate decreased to 21 breaths per minute and SpO_2 increased to 99%. The patient no longer complained of shortness of breath, breathing became regular, and the patient was able to speak continuously without interruption.

Case Patient III involved Mr. S, a 67-year-old male diagnosed with relapsed Pulmonary Tuberculosis following bronchoscopy. Initial assessment on August 14, 2025 showed shortness of breath with a respiratory rate of 26 breaths per minute and SpO_2 of 95%, accompanied by chest wall retraction and use of accessory muscles. After receiving the semi-Fowler position and pursed-lip breathing exercises, gradual improvement was observed. On the third day, the respiratory rate decreased to 20 breaths per minute and SpO_2 increased to 99%. The patient appeared calm, breathing was regular, and light physical activity could be performed without dyspnea.

Overall, all three patients demonstrated positive responses to the implemented interventions. A gradual reduction in respiratory rate toward normal values and a consistent increase in oxygen saturation were observed in all cases. In addition, signs of accessory muscle use and chest wall retraction decreased and were no longer observed by the third day of care. Patients also reported improved comfort, reduced anxiety, and better ability to control their breathing patterns through pursed-lip breathing exercises.

The results of this case study indicate that the combination of the semi-Fowler position and pursed-lip breathing technique is effective in improving ineffective breathing patterns in patients with Pulmonary Tuberculosis. The semi-Fowler position facilitates lung expansion and reduces diaphragmatic pressure, while pursed-lip breathing prolongs expiration, increases positive airway pressure, and enhances gas exchange. Therefore, these non-pharmacological interventions can be recommended as part of routine nursing care for patients with Pulmonary Tuberculosis experiencing breathing pattern disturbances.

Table 1. Changes in Respiratory Rate and Oxygen Saturation

Patient	Initial Respiratory Rate (breaths/min)	Initial SpO_2 (%)	Day-3 Respiratory Rate (breaths/min)	Day-3 SpO_2 (%)	Remarks
Mr. A	27	95	21	99	Dyspnea reduced, regular breathing
Mr. N	28	94	21	99	No dyspnea, no accessory muscle use

Based on the data presented in the table 1, all three patients demonstrated consistent improvement in respiratory status following the implementation of the semi-Fowler position and pursed-lip breathing exercises. A gradual decrease in respiratory rate was observed in each patient, indicating improved breathing efficiency and reduced respiratory effort. By the third day of intervention, the respiratory rates of all patients had returned to or approached normal limits, reflecting a positive response to the nursing interventions provided.

In addition to changes in respiratory rate, oxygen saturation levels (SpO_2) showed a clear upward trend in all patients. Initial SpO_2 values ranged from 94% to 95%, suggesting mild hypoxemia. After three days of intervention, SpO_2 levels increased to 99% in all patients, indicating enhanced oxygenation and improved gas exchange at the alveolar level. This improvement suggests that the combination of semi-Fowler positioning and pursed- lip breathing effectively facilitated lung expansion and optimized ventilation–perfusion matching.

Furthermore, clinical observations supported the quantitative findings. The reduction and eventual absence of accessory muscle use and chest wall retraction indicated decreased work of breathing. Patients also reported reduced dyspnea, increased comfort, and improved ability to control their breathing independently. These findings collectively indicate that the applied non-pharmacological nursing interventions were effective in improving ineffective breathing patterns in patients with Pulmonary Tuberculosis and contributed to overall respiratory stabilization during the hospitalization period.

Discussion

The results of the case study involving three patients diagnosed with Pulmonary Tuberculosis and presenting with the primary nursing problem of ineffective breathing patterns demonstrated significant improvement in respiratory function after the implementation of the semi-Fowler position and pursed-lip breathing exercises over three consecutive days. The observed clinical changes included a reduction in respiratory rate from a range of 26–28 breaths per minute to 20–21 breaths per minute, an increase in oxygen saturation from 94–95% to 99%, decreased use of accessory respiratory muscles, and the disappearance of chest wall retraction. Patients also reported that the sensation of shortness of breath gradually diminished and eventually resolved completely.

The semi-Fowler position plays an important role in improving respiratory mechanics. In this position, the patient s head and chest are elevated at an angle of 30–45°, which increases thoracic cavity volume and reduces intra-abdominal pressure on the diaphragm. This condition allows the diaphragm to move more freely, enabling maximal lung expansion. Optimal lung expansion enhances alveolar ventilation, improves gas

exchange, and facilitates oxygen delivery to body tissues. Additionally, the semi-Fowler position reduces airway resistance and decreases the workload of accessory respiratory muscles. After two days of applying this position, all patients demonstrated more regular and calm breathing patterns without signs of accessory muscle use.

Pursed-lip breathing exercises provided an additional and significant contribution to ventilatory effectiveness. This technique is performed by slowly inhaling through the nose and gently exhaling through pursed lips, thereby prolonging the expiratory phase and creating positive airway pressure. This pressure helps keep the alveoli open, allowing for more efficient oxygen and carbon dioxide exchange. During the exercises, airflow became more controlled and the breathing rhythm slowed, which directly contributed to improved blood oxygen levels. All three patients exhibited an increase in oxygen saturation of approximately 4–5% after performing the exercises regularly for three days.

Beyond its physiological benefits, this breathing exercise also produced a noticeable relaxation effect. The slower breathing rhythm reduces sympathetic nervous system activity, helping patients feel calmer. Emotional stability supports the patients ability to maintain an efficient breathing pattern. Initially, patients appeared anxious and tended to breathe rapidly; however, after two days of training, facial expressions became more relaxed and breathing appeared more rhythmic. This finding highlights the relationship between psychological factors and the effectiveness of pulmonary ventilation.

All three patients showed improvement with nearly identical progression patterns. On the first day, signs of dyspnea and accessory muscle use were still present. On the second day, respiratory rate decreased, oxygen saturation increased, and the sensation of shortness of breath diminished. By the third day, all patients achieved normal breathing patterns with oxygen saturation levels approaching 100%. Similar improvements observed across patients with different medical conditions confirm that the combination of the semi- Fowler position and pursed-lip breathing exercises yields consistent results in improving breathing patterns.

These interventions have practical advantages, as they are easy to apply, require no special equipment, and can be taught to patients for independent practice at home. The success of these interventions demonstrates that non-pharmacological approaches can have a significant impact on improving breathing patterns, particularly in patients with ventilatory impairment due to chronic lung diseases such as Pulmonary Tuberculosis. In addition to their therapeutic role, these exercises also serve as promotive and preventive measures, helping patients maintain optimal lung function after hospital discharge.

Analysis of the results revealed an average decrease in respiratory rate of seven breaths per minute and an average increase in oxygen saturation of five percent. These findings indicate a meaningful improvement in respiratory function within a relatively short period. This success was influenced not only by the effectiveness of the interventions but also by patient motivation and adherence to the exercises. All three patients demonstrated high enthusiasm and compliance during the training sessions, contributing to optimal outcomes. Overall, the implementation of the semi-Fowler position and pursed-lip breathing exercises over three days resulted in consistent clinical improvements across all patients, transforming rapid and shallow breathing patterns into slower and deeper breathing, increasing oxygen saturation to normal levels, and significantly reducing dyspnea.

In conclusion, the semi-Fowler position and pursed-lip breathing exercises are effective non-pharmacological nursing interventions for managing ineffective breathing patterns in patients with Pulmonary Tuberculosis. The combination of these techniques successfully improves respiratory function, enhances gas exchange, reduces shortness of breath, and increases patient comfort and quality of life during the course of care.

5. Conclusion

Based on the implementation of the Semi-Fowler position and Pursed-Lip Breathing exercises in patients with Pulmonary Tuberculosis who experienced ineffective breathing patterns in the Mawar Ward of RSUD X, it can be concluded that prior to nursing intervention, patients exhibited clear signs of ineffective breathing patterns. These signs included increased respiratory rates ranging from 25–28 breaths per minute, the use of accessory respiratory muscles, chest wall retraction, and subjective complaints of shortness of breath. These findings indicate impaired ventilation and reduced respiratory efficiency before appropriate nursing care was provided.

After the regular application of the Semi-Fowler position and Pursed-Lip Breathing exercises during the intervention period, significant improvements in breathing patterns were observed. Patients demonstrated

a decrease in respiratory rate to 20–21 breaths per minute, more regular breathing rhythms, vesicular breath sounds, and increased oxygen saturation levels reaching up to 99%. The combination of the Semi-Fowler position and Pursed-Lip Breathing proved to be effective in improving lung ventilation, enhancing gas exchange, and reducing dyspnea without causing significant adverse effects. Therefore, this combined non-pharmacological intervention had a positive impact on improving the effectiveness of breathing patterns in patients with Pulmonary Tuberculosis treated in the Mawar Ward of RSUD X.

Based on these findings, it is recommended that healthcare institutions consider incorporating the Semi-Fowler position and Pursed-Lip Breathing exercises into standard nursing care protocols for patients with respiratory disorders, particularly Pulmonary Tuberculosis. Nurses and nursing students are encouraged to master and routinely apply these techniques to promote patient independence in managing dyspnea. In addition, patients and their families should be educated to continue simple breathing exercises independently at home to maintain effective breathing patterns and prevent recurrence of dyspnea. Future researchers are advised to conduct studies with larger sample sizes and longer intervention periods to further evaluate the long-term effectiveness of these interventions across various pulmonary conditions.

6. Acknowledgement

The author would like to express sincere gratitude to Allah SWT for His guidance and blessings, which made the completion of this final scientific paper possible. Appreciation is extended to the academic supervisors and examiners for their valuable guidance, constructive feedback, and support throughout the writing process. The author also gratefully acknowledges the Director of RSUD X, the head of the Mawar Ward, and all nursing staff for their cooperation and assistance during data collection and the implementation of nursing care. Special thanks are given to parents, family members, friends, and colleagues for their prayers, encouragement, and continuous support. The author hopes that this paper will contribute positively to the development of nursing science and serve as a useful reference for future research.

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