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Pursed-Lip Breathing as a Belief-Based Nursing Intervention to Reduce Respiratory Rate in Patients with Pulmonary Tuberculosis: A Narrative Literature Review

Fernando Da Costa Fernandes[1*], Indah Sri Wahyuningsih[2], Dwi Heppy Rochmawati[2], Erna Melastuti[2]

[1]Master of Nursing, Faculty of Nursing, Universitas Islam Sultan Agung, Semarang, Indonesia

[2]Faculty of Nursing, Universitas Islam Sultan Agung, Semarang, Indonesia

ABSTRACT

Background: Pulmonary tuberculosis remains a major global health concern and is frequently accompanied by increased respiratory rate due to impaired lung function. Non-pharmacological nursing interventions that incorporate patients' belief systems may enhance physiological and psychological outcomes.

Objective: This review aims to examine the effectiveness of pursed-lip breathing as a belief-based nursing intervention in reducing respiratory rate among patients with pulmonary tuberculosis.

Methods: A narrative literature review was conducted by analyzing studies published between 2020 and 2026. Literature was obtained from PubMed, Google Scholar, ScienceDirect, DOAJ, and Garuda using relevant keywords. Articles were selected based on predefined inclusion criteria, and a total of 7 studies were analyzed using a descriptive approach.

Results: The findings show that pursed-lip breathing consistently contributes to a reduction in respiratory rate by improving ventilation efficiency and prolonging the expiratory phase. When integrated with belief-oriented nursing care, such as spiritual support or culturally relevant practices, patients demonstrated better adherence, reduced anxiety, and more stable breathing patterns. Several studies reported significant improvements in respiratory parameters following the intervention.

Discussion: The effectiveness of pursed-lip breathing is strengthened when aligned with patients' beliefs, as it addresses both physiological and psychological dimensions of care. This integrative approach supports patient-centered nursing practice and enhances overall therapeutic outcomes.

Conclusion: Pursed-lip breathing, when applied as a belief-based nursing intervention, shows promising potential in reducing respiratory rates among patients with pulmonary tuberculosis, although further rigorous studies are needed to confirm its long-term effectiveness.

ARTICLE DETAILS

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INTRODUCTION

Pulmonary tuberculosis (TB) remains one of the leading infectious diseases worldwide and continues to impose a substantial burden on healthcare systems, particularly in low- and middle-income countries. Globally, tuberculosis accounted for an estimated 10.6 million new cases in 2023, with Indonesia ranking among the highest burden countries, reporting approximately 1,060,000 cases and an incidence rate of 394 per 100,000 population [1]. In addition to impaired gas exchange, patients with pulmonary TB frequently experience an increased respiratory rate as a compensatory response to lung inflammation and decreased pulmonary compliance. This condition often leads to fatigue, dyspnea, and decreased quality of life, thereby requiring effective and feasible nursing interventions to manage respiratory symptoms.

In recent years, *pursed-lip breathing* (PLB) has been widely studied as a non-pharmacological intervention to improve respiratory function. This technique works by prolonging the expiratory phase and enhancing ventilation efficiency, which ultimately contributes to the stabilization of breathing patterns and reduction of respiratory rate [2,3]. Several studies have demonstrated that the regular application of PLB significantly decreases respiratory rate in patients with pulmonary tuberculosis and improves overall respiratory function [3]. Additionally, PLB has been demonstrated to enhance breathing patterns and reduce ineffective airway clearance in TB patients, underscoring its clinical significance in nursing practice [2].

Further evidence indicates that PLB also contributes to reducing dyspnea and improving oxygenation status. The consistent application of this technique has been associated with improved breathing comfort and more stable respiratory frequency among pulmonary TB patients [4]. Moreover, combining PLB with supportive positioning techniques, such as semi-Fowler or tripod positions, has been shown to produce greater improvements in respiratory outcomes compared to single interventions [5,6]. A narrative synthesis of recent studies also confirms that PLB is a simple, safe, and cost-effective intervention that can be implemented independently by patients to improve respiratory parameters [7]. In a broader context, breathing exercises have also been found to reduce fatigue and enhance physiological adaptation in individuals with tuberculosis [8].

Despite these promising findings, most existing studies have primarily focused on the physiological effects of PLB, with limited attention to the role of patients' belief systems in influencing intervention outcomes. In nursing practice, belief, whether spiritual, cultural, or personal, plays an important role in shaping patients' perceptions, coping strategies, and treatment adherence. Interventions that are aligned with patients' beliefs tend to be more acceptable and sustainable, thereby improving both psychological well-being and physiological responses.

The urgency of this review lies in the need to integrate physiological and holistic approaches within nursing care. As TB management increasingly emphasizes patient-centered and culturally sensitive care, understanding how belief-oriented nursing care can enhance the effectiveness of PLB becomes highly relevant. A comprehensive review is therefore needed to provide a deeper understanding of how this intervention can be optimized in clinical nursing practice. To date, no review has specifically examined pursed-lip breathing as a belief-based nursing intervention in patients with pulmonary tuberculosis.

Therefore, this narrative literature review aims to analyze the effectiveness of pursed-lip breathing as a belief-based nursing intervention in reducing respiratory rate among patients with pulmonary tuberculosis and to explore its implications for holistic and evidence-based nursing practice.

METHOD

This study employed a narrative literature review design to synthesize current evidence on the effectiveness of pursed-lip breathing as a belief-based nursing intervention in reducing respiratory rate among patients with pulmonary tuberculosis. The literature search was conducted systematically using several electronic databases, including PubMed, Google Scholar, ScienceDirect, Directory of Open Access Journals (DOAJ), and Garuda. Keywords were developed using a combination of Medical Subject Headings (MeSH) and free-text terms, such as "pursed-lip breathing," "pulmonary tuberculosis," "respiratory rate," "breathing exercise," and "belief-based nursing." Boolean operators (AND, OR) were applied to refine the search and ensure the retrieval of relevant studies. The search was limited to articles published between 2021 and 2026 to ensure the inclusion of recent and up-to-date evidence.

The selection of articles was carried out through several stages. Initially, all identified records were screened based on titles and abstracts to exclude studies that were not relevant to the topic. Full-text articles were then assessed according to predefined inclusion and exclusion criteria. The inclusion criteria consisted of (1) studies involving patients with pulmonary tuberculosis, (2) studies examining pursed-lip breathing or similar breathing interventions, (3) articles reporting outcomes related to respiratory rate or respiratory function, and (4) original research or literature reviews published in English or Indonesian. Exclusion criteria included duplicate articles, studies with incomplete data, conference abstracts, and articles not accessible in full text. The process of article selection followed a structured flow resembling the PRISMA approach, which illustrates identification, screening, eligibility, and inclusion stages. Although this study adopts a narrative review approach, the selection process was guided by a PRISMA-informed framework to enhance transparency.

Data from the selected articles were extracted and organized into a summary table, including author, year of publication, study design, sample characteristics, intervention details, and key findings. The analysis was conducted using a descriptive and thematic synthesis approach. Findings from each study were compared and grouped based on recurring themes, particularly focusing on physiological outcomes (such as respiratory rate reduction) and the integration of belief-based components in nursing interventions. This approach allowed for a comprehensive understanding of the existing evidence and facilitated the identification of patterns, consistencies, and gaps within the literature.

Table 1: Data Search Based

Database	Keyword	Number of Articles Found
PubMed	("Tuberculosis, Pulmonary"[MeSH] OR "pulmonary tuberculosis") AND ("Pursed-Lip Breathing" OR "breathing exercises") AND ("Respiratory Rate"[MeSH] OR "respiratory pattern")	12
ScienceDirect	("pulmonary tuberculosis" AND "pursed-lip breathing") AND ("respiratory rate" OR "breathing pattern")	8
Google Scholar	("pulmonary tuberculosis" AND "breathing exercise") AND ("respiratory rate" OR "respiratory function")	15
DOAJ	("pulmonary tuberculosis" AND "non-pharmacological therapy") AND ("respiratory rate" OR "pulmonary rehabilitation")	5
Garuda	("tuberkulosis paru" AND "pursed lip breathing") AND ("frekuensi pernapasan" OR "fungsi respirasi")	4
Total		**44**

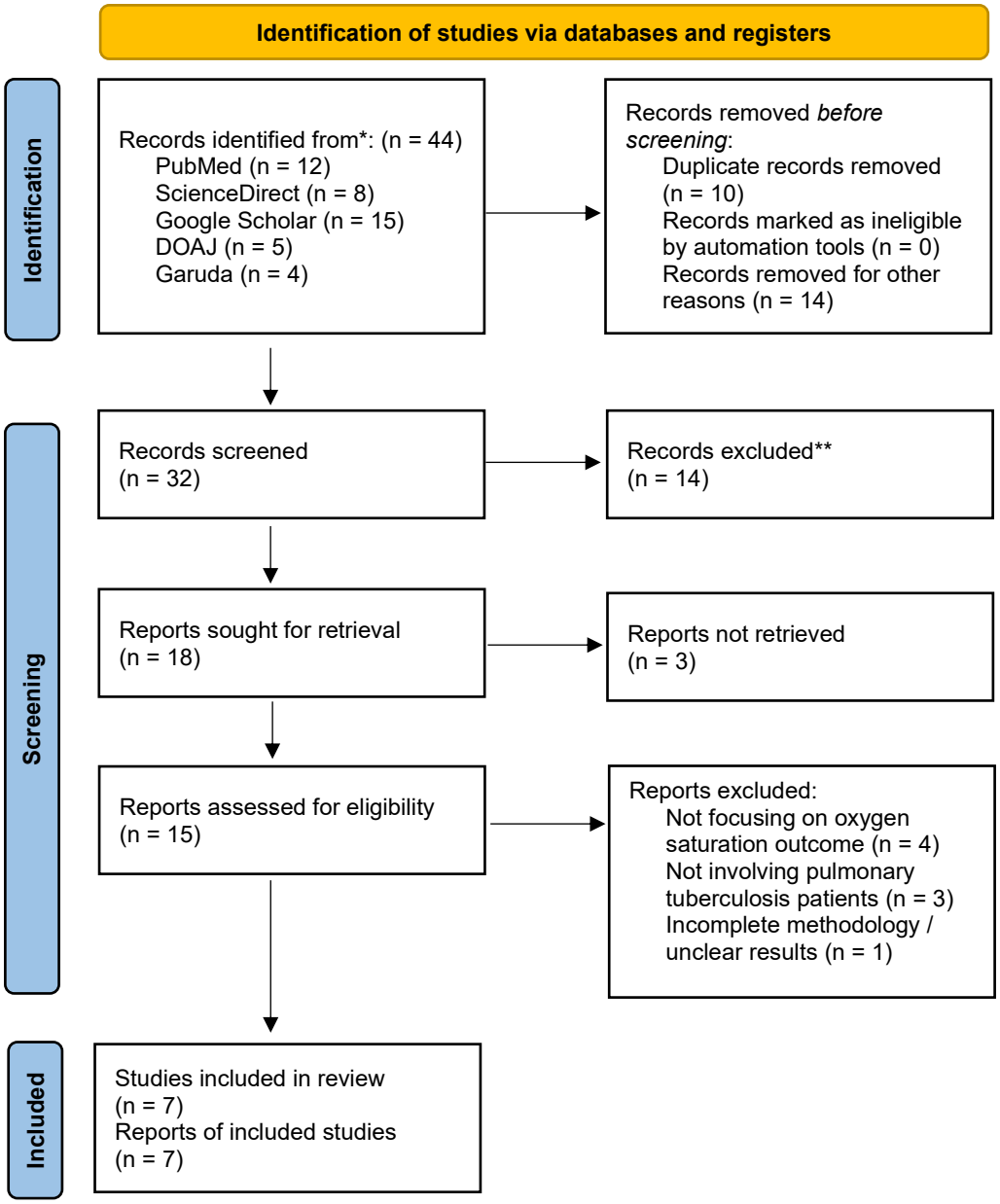

Figure 1. Prisma Flow

RESULT

This review synthesizes findings from seven selected studies that examine the effectiveness of pursed-lip breathing (PLB) as a nursing intervention in patients with pulmonary tuberculosis and other respiratory conditions. The results are presented thematically to provide a structured understanding of how PLB contributes to the regulation of respiratory rate, particularly when integrated with supportive and belief-oriented nursing care.

Based on the analysis of the included studies, three main themes were identified: (1) the role of pursed-lip breathing in reducing respiratory rate, (2) the physiological mechanisms underlying respiratory improvement, and (3) the contribution of supportive and belief-oriented nursing care in enhancing intervention outcomes.

Theme 1. The Role of Pursed-Lip Breathing in Reducing Respiratory Rate

Table 2. Synthesis of Pursed-Lip Breathing Effects on Respiratory Rate

Aspect	Description
Intervention focus	Controlled breathing technique emphasizing slow exhalation
Target outcome	Reduction in respiratory rate and stabilization of breathing pattern
Observed effects	Decreased respiratory frequency, reduced dyspnea, improved breathing comfort
Clinical relevance	Applicable as a simple, non-invasive nursing intervention

The synthesis of the reviewed studies indicates that pursed-lip breathing consistently contributes to a reduction in respiratory rate. This technique promotes a more controlled breathing pattern by extending the expiratory phase, allowing patients to regulate airflow more effectively. Across the included studies, improvements in respiratory rate were often accompanied by decreased dyspnea and enhanced comfort during breathing.

Although the degree of improvement varies, the overall pattern suggests that PLB is a reliable intervention for managing tachypnea in patients with pulmonary tuberculosis. Its simplicity and ease of application also support its use in routine nursing care and patient self-management.

Theme 2. Physiological Mechanisms of Respiratory Improvement

Table 3. Synthesis of Physiological Mechanisms of Pursed-Lip Breathing

Aspect	Description
Mechanism of action	Prolonged exhalation increases airway pressure and prevents airway collapse
Ventilatory impact	Improves alveolar ventilation and reduces air trapping
Gas exchange	Enhances oxygen diffusion and reduces ventilation inefficiency
Clinical implication	Supports stabilization of respiratory patterns and reduces respiratory workload

The findings suggest that the effectiveness of pursed-lip breathing is closely related to its physiological impact on the respiratory system. By maintaining positive pressure during exhalation, PLB helps prevent premature airway collapse and facilitates more efficient gas exchange. This mechanism is particularly relevant in pulmonary tuberculosis, where lung tissue damage may impair normal ventilation.

The synthesis also indicates that improved ventilation efficiency contributes indirectly to the reduction of respiratory rate, as patients no longer need to compensate through rapid breathing. As a result, breathing becomes more efficient rather than merely faster.

Theme 3. The Role of Supportive and Belief-oriented Nursing Care

Table 4. Synthesis of Supportive and Belief-Oriented Nursing Care

Aspect	Description
Intervention focus	Integration of breathing techniques with psychological or belief-based support
Mechanism	Enhances relaxation, reduces anxiety, and promotes patient engagement
Outcomes	Improved adherence, more stable breathing pattern, enhanced comfort
Clinical implication	Supports holistic and patient-centered nursing care

In addition to physiological effects, the reviewed studies highlight the importance of supportive approaches in enhancing the effectiveness of PLB. Interventions that incorporate elements such as relaxation, emotional support, or alignment with patients' beliefs tend to produce more stable and sustained outcomes.

The synthesis suggests that belief-oriented nursing care contributes by reducing anxiety and promoting a sense of control, which in turn facilitates more effective breathing patterns. Patients who feel psychologically supported are more likely to perform breathing exercises consistently and correctly.

Overall, the results of this review indicate that pursed-lip breathing plays a significant role in reducing respiratory rate through both physiological and behavioral mechanisms. The intervention improves ventilation efficiency, stabilizes breathing patterns, and reduces respiratory distress. When combined with supportive and belief-oriented nursing care, its effectiveness appears to be enhanced, leading to better adherence and more consistent outcomes.

These findings reinforce the value of integrating simple breathing techniques with holistic nursing care to optimize respiratory management in patients with pulmonary tuberculosis.

DISCUSSION

This review provides a novel contribution by conceptualizing pursed-lip breathing not only as a physiological technique but also as a belief-based nursing intervention. By integrating both physical and psychological dimensions, this approach offers a more holistic framework for managing respiratory rate in patients with pulmonary tuberculosis.

1. The Role of Pursed-Lip Breathing in Reducing Respiratory Rate

The findings indicate that *pursed-lip breathing* (PLB) contributes to the reduction of respiratory rate by promoting a slower and more controlled breathing pattern. From a physiological perspective, effective ventilation is not solely determined by breathing frequency but by the efficiency of alveolar gas exchange [9]. PLB facilitates a shift from rapid, shallow breathing to a more regulated pattern, allowing for improved oxygen utilization and reduced respiratory workload [5]. This aligns with respiratory physiology principles, where controlled expiration enhances ventilation efficiency and reduces unnecessary energy expenditure [9].

However, an important gap emerges when considering the relationship between reduced respiratory rate and actual improvement in pulmonary function. In patients with advanced pulmonary tuberculosis, structural lung damage such as fibrosis and cavitation may limit the effectiveness of breathing interventions. As a result, a decrease in respiratory rate does not always correspond to optimal oxygenation or gas exchange. This highlights a discrepancy between functional improvement and structural limitation [10].

From a theoretical standpoint, the concept of ventilation–perfusion (V/Q) mismatch explains this gap. Even if ventilation improves through PLB, impaired perfusion in damaged lung areas may prevent effective oxygen transfer [10]. Previous physiological studies have emphasized that respiratory interventions are most effective when both ventilation and perfusion remain relatively intact [9]. Therefore, PLB should be understood as a supportive intervention that optimizes breathing patterns rather than a definitive solution for impaired oxygenation.

2. Physiological Mechanisms Underlying Respiratory Regulation

The effectiveness of PLB is closely related to its underlying physiological mechanisms. By creating positive pressure during exhalation, PLB helps maintain airway patency and prevents premature airway collapse. This mechanism improves alveolar ventilation, reduces air trapping, and enhances overall breathing efficiency [5]. As a result, the respiratory system requires less compensatory effort, which contributes to the reduction in respiratory rate.

Despite this well-established mechanical explanation, there is ongoing debate regarding the extent to which PLB also influences central respiratory control. Breathing is regulated not only by lung mechanics but also by neural mechanisms involving the brainstem and autonomic nervous system [11]. Controlled breathing techniques have been associated with modulation of respiratory drive and autonomic balance, particularly through changes in carbon dioxide sensitivity and neural feedback mechanisms [12].

A notable gap in the literature is the limited integration of mechanical and neurophysiological perspectives. Most explanations of PLB focus on peripheral lung mechanics, while fewer studies explore its influence on central respiratory regulation. Emerging evidence suggests that slow and controlled breathing can enhance parasympathetic activity and reduce sympathetic dominance, leading to more stable respiratory patterns [13]. This indicates that the benefits of PLB may extend beyond the lungs to include central regulation of breathing, although this aspect remains underexplored in tuberculosis populations.

3. The Contribution of Belief-oriented nursing care in Nursing Interventions

An important dimension highlighted in this review is the role of belief-oriented nursing care in enhancing the effectiveness of PLB. In nursing practice, patients' beliefs, whether spiritual, cultural, or personal, play a significant role in shaping health behaviors, emotional responses, and treatment adherence [14]. Interventions that align with these beliefs are more likely to be accepted and consistently practiced, which ultimately influences clinical outcomes.

The integration of belief-based elements into breathing interventions may enhance relaxation, reduce anxiety, and improve patient engagement. From a psychophysiological perspective, emotional stability is closely linked to respiratory regulation. Anxiety and stress are known to increase respiratory rate and disrupt breathing patterns, while relaxation promotes slower and more controlled respiration [15]. Therefore, belief-based support can indirectly strengthen the effectiveness of PLB by creating a psychological state that facilitates proper breathing technique.

Nevertheless, there is a conceptual gap in defining and standardizing belief-based interventions. The term "belief" encompasses a wide range of individual experiences, making it difficult to operationalize in clinical research. Variability in cultural and spiritual contexts further complicates the development of standardized intervention protocols.

The biopsychosocial-spiritual model provides a useful framework to address this gap, suggesting that health outcomes are influenced by the interaction of biological, psychological, social, and spiritual factors [16]. In this

context, integrating PLB with belief-oriented nursing care can be understood as addressing multiple dimensions of patient care simultaneously. In addition, self-efficacy theory highlights that patients who find personal meaning in their care are more likely to actively engage in therapeutic interventions [14].

4. Clinical Implications and Theoretical Integration

The findings of this review highlight the importance of a multidimensional approach in managing respiratory symptoms among patients with pulmonary tuberculosis. PLB should not be viewed solely as a mechanical breathing technique but as part of a broader therapeutic strategy that includes psychological and belief-based support. This integrative approach reflects the principles of patient-centered care, where interventions are tailored to individual needs and values [17].

From a clinical perspective, nurses play a crucial role in facilitating this integration. Teaching PLB requires not only technical instruction but also an understanding of the patient's psychological condition and belief system. By incorporating culturally sensitive and belief-aligned approaches, nurses can enhance patient engagement and improve adherence to the intervention [14].

Despite its potential, the integration of physiological and belief-oriented nursing care remains insufficiently explored in current research. There is a need for more comprehensive and methodologically robust studies that examine how these dimensions interact and influence clinical outcomes. Without a clear conceptual framework, the application of belief-based PLB interventions may remain inconsistent across clinical settings.

In summary, PLB demonstrates strong potential as a non-pharmacological nursing intervention to reduce respiratory rate. Its effectiveness is influenced by a combination of physiological mechanisms, neural regulation, and psychological factors. Integrating belief-oriented nursing care may further enhance its impact, supporting a more holistic and patient-centered model of care [18].

CONCLUSION

This narrative literature review demonstrates that pursed-lip breathing (PLB) is an effective non-pharmacological nursing intervention in reducing respiratory rate among patients with pulmonary tuberculosis. The findings indicate that PLB improves breathing efficiency through controlled exhalation, leading to more stable respiratory patterns and reduced respiratory distress. Beyond its physiological effects, the integration of belief-oriented nursing care enhances patient engagement, promotes relaxation, and supports more consistent implementation of the intervention.

A key insight from this review is that the effectiveness of PLB is not solely determined by its mechanical impact on the respiratory system, but also by the patient's psychological and belief-related context. The combination of breathing control and belief-based support provides a more comprehensive approach that addresses both physical and emotional dimensions of care.

The novelty of this review lies in its integrative perspective, which positions PLB as a belief-based nursing intervention rather than a purely physiological technique. This approach highlights the importance of aligning clinical interventions with patients' values and beliefs to optimize outcomes. Therefore, PLB combined with belief-based strategies has the potential to be developed as a holistic, patient-centered intervention in the management of respiratory problems in pulmonary tuberculosis.

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