EFFECTIVENESS OF NON-PHARMACOLOGICAL AND NURSING INTERVENTIONS FOR DYSPNEA IN COPD PATIENTS: A SYSTEMATIC REVIEW

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Abstract

Background: *Dyspnea is one of the most debilitating symptoms experienced by patients with Chronic Obstructive Pulmonary Disease (COPD), significantly impairing physical function and quality of life. Despite optimal pharmacological management, many patients continue to suffer from breathlessness. Non-pharmacological and nursing-led interventions are increasingly recognized as effective adjuncts to standard therapy.* ***Objective:*** *To systematically review and evaluate the effectiveness of non-pharmacological and nursing interventions—such as inspiratory muscle training (IMT), Tai Chi, pulmonary rehabilitation, and breathing techniques—in reducing dyspnea and improving quality of life in patients with COPD.* ***Methods:*** *A systematic search was conducted in PubMed, CINAHL, Cochrane Library, and Google Scholar for studies published between January 2020 and June 2025. Eligible studies included randomized controlled trials (RCTs), meta-analyses, and systematic reviews involving adult COPD patients receiving non-pharmacological or nursing-led interventions. Outcomes assessed were dyspnea (MMRC, Borg Scale, TDI) and quality of life (SGRQ, CAT). Risk of bias was evaluated using the Cochrane RoB 2 tool and AMSTAR-2 for reviews.* ***Results:*** *Fifteen studies (11 RCTs, 2 meta-analyses, 2 systematic reviews) met the inclusion criteria. IMT showed moderate-to-large reductions in dyspnea (SMD −0.50 to −0.90) and improvements in quality of life (SMD 0.48). Tai Chi and Tai Chi Qigong significantly improved functional capacity and SGRQ scores (12–17 point reductions). Nursing empowerment within pulmonary rehabilitation programs enhanced adherence, psychological outcomes, and patient satisfaction.* ***Conclusion:*** *Non-pharmacological interventions, especially IMT and Tai Chi, are effective in alleviating dyspnea and enhancing quality of life in COPD patients. Nursing-led strategies play a critical role in optimizing these outcomes. Further multicenter RCTs with standardized outcome measures and long-term follow-up are recommended.*

Keywords: **COPD, Dyspnea, Nursing Interventions, Inspiratory Muscle Training, Tai Chi, Quality of Life**

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a progressive, incurable respiratory condition characterized by airflow limitation, chronic inflammation, and structural abnormalities in the lungs. Globally, COPD is the third leading cause of death, accounting for an estimated 3.2 million deaths annually (WHO, 2023). One of the most persistent and distressing symptoms in COPD is dyspnea, or shortness of breath, which significantly impairs patients' functional capacity, restricts physical activity, diminishes quality of life, and increases the frequency of healthcare utilization and hospitalization. While pharmacological management—including bronchodilators, inhaled corticosteroids, and combination therapies—remains the cornerstone of COPD treatment, many patients continue to experience residual dyspnea despite optimal medication adherence. This has necessitated the exploration of non-pharmacological interventions, particularly those that can be led or facilitated by nurses, to provide comprehensive, holistic, and patient-centered care.Among the most studied non-pharmacological interventions are Inspiratory Muscle Training (IMT), Tai Chi, pulmonary rehabilitation (PR), and breathing retraining techniques. These approaches target multiple dimensions of COPD management: IMT aims to strengthen the respiratory muscles and improve ventilatory efficiency; Tai Chi enhances balance, breathing control, and psychological well-being; and structured pulmonary rehabilitation programs—often incorporating exercise, education, and behavioral modification—have demonstrated improvements in dyspnea, exercise tolerance, and quality of life. In addition, nursing empowerment, defined as the involvement of nurses in patient education, self-management coaching, and individualized follow-up, has shown promise in enhancing adherence, reducing anxiety and depression, and improving overall satisfaction with care.Despite the growing body of literature, there remains a gap in the synthesis of evidence specifically evaluating the effectiveness of these interventions when delivered or supported by nurses. Nursing professionals are often the primary point of contact for COPD patients across clinical and community settings, making their role vital in the implementation of non-pharmacological therapies. However, variations in study design, intervention protocols, outcome measures, and follow-up periods have made it challenging to standardize recommendations or inform clinical guidelines.Furthermore, existing systematic reviews often focus either on pharmacological treatments or on single interventions, lacking a comprehensive evaluation of the range of non-pharmacological and nursing-led strategies available. This is especially relevant in resource-limited settings, where access to specialized pulmonary care is restricted, and cost-effective, community-based interventions led by trained nurses could be scaled up effectively.Given these gaps, the current systematic review aims to evaluate and synthesize evidence from randomized controlled trials (RCTs), meta-analyses, and systematic reviews on the effectiveness of non-pharmacological and nursing interventions in managing dyspnea and improving quality of life among patients with COPD. The review follows PRISMA 2020 guidelines to ensure methodological rigor and transparency. By identifying effective strategies and highlighting the role of nursing in their delivery, this review seeks to inform clinical practice, support interdisciplinary care, and guide future research in the domain of COPD management.

Objectives

The primary objective of this systematic review is to evaluate the effectiveness of non-pharmacological and nursing-led interventions in reducing dyspnea and improving quality of life among patients with Chronic Obstructive Pulmonary Disease (COPD). Specifically, the review focuses on interventions such as inspiratory muscle training (IMT), Tai Chi, pulmonary rehabilitation, and breathing retraining techniques. By synthesizing evidence from recent randomized controlled trials, meta-analyses, and systematic reviews, this study aims to inform clinical practice, support nurse-led care strategies, and identify gaps for future research in the holistic management of COPD-related breathlessness.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines**.** The review protocol included predefined eligibility criteria, a comprehensive search strategy, quality assessment tools, and standardized data extraction procedures.

Eligibility Criteria

Studies were included if they met the following criteria:

- **Study Design**: Randomized controlled trials (RCTs), systematic reviews, or meta-analyses.
- **Population**: Adults (≥18 years) diagnosed with COPD, classified as GOLD stages II to IV.
- **Interventions**: Non-pharmacological or nursing-led interventions such as inspiratory muscle training (IMT), Tai Chi, pulmonary rehabilitation, breathing techniques, or airway clearance methods.
- **Comparators**: Usual care, sham interventions, or other exercise-based therapies.
- **Outcomes**: Primary outcomes included dyspnea measured by the Modified Medical Research Council (MMRC) scale, Borg Scale, or Transitional Dyspnea Index (TDI); and quality of life measured by the St. George's Respiratory Questionnaire (SGRQ) or COPD Assessment Test (CAT).
- **Language**: Articles published in English.
- **Time Frame**: January 2020 to June 2025.

Exclusion criteria included studies focusing solely on pharmacological interventions, pediatric populations, case reports, and non-peer-reviewed literature.

Search Strategy: A systematic search was conducted in four databases: PubMed, CINAHL, Cochrane Library, and Google Scholar. The search terms included: COPD, dyspnea, nursing interventions, non-pharmacological, inspiratory muscle training, Tai Chi, pulmonary rehabilitation, and airway clearance techniques. Boolean operators such as "AND" and "OR" were used to refine the search. Additionally, the reference lists of all included studies and relevant review articles were manually searched for eligible studies.

Data Extraction and Synthesis: Two independent reviewers screened titles and abstracts, followed by full-text review. A standardized data extraction form was used to collect information on study design, sample size, intervention characteristics, outcome measures, effect sizes, and conclusions.

Risk of Bias Assessment: The Cochrane Risk of Bias 2 (RoB 2) tool was applied to assess the quality of RCTs, while the AMSTAR-2 tool was used for systematic reviews and meta-analyses. Discrepancies were resolved by consensus or consultation with a third reviewer.

Data Analysis: Due to heterogeneity in interventions and outcome measures, a narrative synthesis was conducted. Where applicable, reported effect sizes (e.g., standardized mean difference, confidence intervals) from meta-analyses were included.

Results

Study Selection: A total of 520 records were initially identified through electronic database searches of PubMed, CINAHL, Cochrane Library, and Google Scholar. After removing 120 duplicate records, 400 articles remained for title and abstract screening. Following the initial screening, 55 full-text articles were assessed for eligibility based on predefined inclusion and exclusion criteria. Ultimately, 15 studies were included in the final synthesis: 11 randomized controlled trials (RCTs), 2 meta-analyses, and 2 systematic reviews.

PRISMA Flow Diagram

The study selection process is illustrated below, based on the PRISMA 2020 guidelines:

Figure 1. PRISMA Flow Diagram

Records identified through database search (n = 520)

└── Duplicates removed (n = 120)

  └── Records screened (n = 400)

    └── Full-text articles assessed for eligibility (n = 55)

      └── Studies included in final review (n = 15)

Characteristics of Included Studies

- **Population**: All studies included adult patients with stable COPD, classified under GOLD stages II–IV.
- **Interventions**: Included Inspiratory Muscle Training (IMT), Tai Chi, Tai Chi Qigong, pulmonary rehabilitation with nursing empowerment, breathing techniques, and airway clearance interventions.
- **Comparators**: Usual care, sham training, or alternative exercise regimens.
- **Primary Outcomes**: Dyspnea measured via MMRC, Borg Scale, or TDI; Quality of Life assessed using SGRQ or CAT; secondary outcomes included exercise tolerance (6MWD) and lung function (FEV_1, MIP).
- **Follow-up Duration**: Ranged from 8 to 24 weeks; one study extended to 6 months.

Summary of Key Findings

- **Inspiratory Muscle Training (IMT)** demonstrated **moderate to large improvements** in dyspnea (SMD −0.50 to −0.90) and quality of life (SMD 0.48).
- **Tai Chi and Tai Chi Qigong** interventions were associated with significant improvements in exercise capacity (6MWD increase by ~30–50 meters) and QoL (SGRQ reductions by 12–17 points).
- **Pulmonary rehabilitation with nursing empowerment** showed marked improvements in psychological outcomes, patient satisfaction, and symptom control.
- **Airway clearance techniques** had supportive but limited evidence regarding dyspnea reduction.

Risk of Bias

- The majority of included RCTs were rated as **low to moderate risk of bias**, with adequate randomization and validated outcome measures.
- Meta-analyses were assessed as **moderate to high quality**, with one showing **minimal publication bias**.
- Common limitations included small sample sizes and lack of blinding in some Tai Chi trials.

DISCUSSION

This systematic review highlights the growing evidence base supporting the effectiveness of non-pharmacological and nursing interventions in managing dyspnea and enhancing quality of life in patients with Chronic Obstructive Pulmonary Disease (COPD). Among the reviewed strategies, Inspiratory Muscle Training (IMT) and Tai Chi/Tai Chi Qigong emerged as the most effective and consistently beneficial across various clinical outcomes.IMT demonstrated moderate to large improvements in dyspnea and respiratory muscle strength. This intervention is physiologically grounded in enhancing the strength and endurance of the diaphragm and accessory breathing muscles, thereby reducing ventilatory effort during daily activities. The clinical significance of these findings is particularly relevant in moderate-to-severe COPD, where respiratory muscle fatigue contributes significantly to functional limitations. Furthermore, the review found that IMT combined with manual therapy provided superior benefits compared to IMT alone, suggesting a potential role for multi-modal interventions. Tai Chi and Tai Chi Qigong consistently improved quality of life, functional capacity (as measured by 6MWD), and psychological well-being. These low-impact, rhythmic movement practices are particularly well-suited for elderly COPD patients due to their safety profile and ability to integrate breath control, balance, and mindfulness. The holistic nature of Tai Chi also addresses psychological factors such as anxiety and depression, which are common comorbidities in COPD.Pulmonary rehabilitation that incorporates nursing empowerment—through education, self-management coaching, and emotional support—showed positive effects on adherence, anxiety, depression, and patient satisfaction. These findings reinforce the essential role of nurses in multidisciplinary care models. Nurses, being the most accessible healthcare professionals, are strategically positioned to deliver and sustain these interventions, especially in resource-limited or community-based settings.While airway clearance techniques are commonly employed in COPD care, the current review found limited high-quality evidence supporting their effectiveness in reducing dyspnea among stable patients. These techniques may be more beneficial during acute exacerbations or in patients with co-existing bronchiectasis. Limitations of the evidence include heterogeneity in intervention protocols, variability in outcome measures, short follow-up durations, and small sample sizes in several trials. Moreover, many studies lacked blinding,

which could introduce performance bias. Future research should aim to standardize protocols and adopt longer follow-up periods to assess the sustainability of intervention benefits.Overall, this review supports the integration of non-pharmacological and nurse-led interventions into routine COPD care. These strategies not only address physical symptoms but also improve psychosocial outcomes, thereby contributing to comprehensive, patient-centered care. The findings underscore the need for policy-makers and healthcare institutions to invest in nurse training and multidisciplinary pulmonary rehabilitation programs.

Conclusion and Recommendations

Conclusion: This systematic review demonstrates strong evidence supporting the use of non-pharmacological and nursing-led interventions—particularly Inspiratory Muscle Training (IMT) and Tai Chi—in the management of dyspnea and improvement of quality of life among patients with Chronic Obstructive Pulmonary Disease (COPD). IMT was found to significantly enhance respiratory muscle strength and reduce breathlessness, while Tai Chi offered additional holistic benefits, improving physical function and psychological well-being. Furthermore, the incorporation of nursing empowerment strategies within pulmonary rehabilitation programs contributed to better adherence, enhanced patient satisfaction, and reductions in anxiety and depression. These findings affirm the pivotal role of nurses in delivering patient-centered, evidence-based, and community-accessible COPD care. Despite these positive outcomes, limitations such as short follow-up durations, variability in intervention protocols, and methodological inconsistencies warrant cautious interpretation of results. More robust, multicenter randomized controlled trials with standardized outcome measures are needed to validate and extend these findings.

Recommendations

- **Clinical Integration**: Non-pharmacological interventions such as IMT and Tai Chi should be incorporated into routine COPD management, especially for patients with persistent dyspnea despite pharmacological therapy.
- **Nursing-Led Care**: Empowerment-based nursing roles—including education, motivation, and follow-up—should be formalized within pulmonary rehabilitation programs to enhance long-term outcomes.
- **Training and Capacity Building**: Healthcare systems should invest in training nurses and allied health professionals in delivering these interventions effectively, especially in resource-limited settings.
- **Research and Policy Support**: Future research should prioritize large-scale trials with long-term follow-up. National health policies should recognize and support the integration of nurse-led, non-pharmacological strategies in chronic respiratory disease care.

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