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What is the impact of respiratory therapy interventions on the quality of life in patients with comorbid heart failure and chronic obstructive pulmonary disease?

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Abstract

Chronic obstructive pulmonary disease (COPD) and heart failure frequently coexist, significantly impairing patients' quality of life (QoL). Respiratory therapy interventions, including pulmonary rehabilitation (PR) and complementary therapies, may alleviate symptoms and improve outcomes in this population. A systematic review was conducted using PubMed, MEDLINE, EMBASE, and CINAHL databases. Seven studies meeting the inclusion criteria (peer-reviewed, QoL outcomes, comorbid COPD-heart failure) were analyzed. Interventions included PR, exercise-based therapies, Tai Chi, Yoga, and acupuncture. Quality assessment was performed using Cochrane's Risk of Bias Tool and NHLBI criteria. PR consistently improved QoL by enhancing physical function, reducing dyspnea, and alleviating anxiety/depression. Complementary therapies showed potential benefits in relaxation and self-efficacy but lacked robust evidence. Limitations included small sample sizes and heterogeneous protocols. Respiratory therapies, particularly PR, effectively improve QoL in patients with COPD and heart failure. Standardized interventions and further research on complementary approaches are needed to optimize care.

Keywords: COPD, Quality of life, Heart Failure, Pulmonary rehabilitation, Respiratory therapy.

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic airway disease characterized by irreversible airflow limitation [1, 2]. Regional variations exist in COPD prevalence, ranging from 4% in Europe, 6.3% in the Asia Pacific, 4-9% in the US, to approximately 11% in Africa, based on 2010 epidemiological data [3-7]. This chronic condition

significantly impacts both physical and mental health [8-11] with systemic effects contributing to cardiovascular disease, pulmonary hypertension, and pneumonia [12-14].

Patients with COPD demonstrate higher rates of anxiety, depression, and fatigue compared to non-COPD populations [15-18]. Candemir et al. [19] examined the relationship between COPD assessment and pulmonary rehabilitation (PR) outcomes, while Engel et al. [9] conducted an RCT (n=202) investigating combined exercise and manual therapy for stable mild COPD. Multiple studies have demonstrated PR's benefits for COPD patients [20-22], though some findings remain debated due to small sample sizes [23-25].

PR is considered the gold standard for reducing dyspnea and improving physical performance and quality of life [18, 26], offering physiological, psychological, and economic benefits for patients with chronic respiratory conditions. Despite its efficacy, pulmonary rehabilitation remains underutilized worldwide [27]. Systematic reviews serve as valuable evidence sources for guiding clinical practice and policy development [28].

This study aims to conduct a systematic assessment of the body of research on how respiratory therapy interventions affect the quality of life for patients who have both COPD and concomitant heart failure. By combining the available data, this study aims to shed light on the efficacy of respiratory treatments and provide possible directions for further investigation to improve patient outcomes in this susceptible group.

2. Methods

2.1. Data Collection

Data Collection: This systematic review aimed to evaluate the impact of respiratory therapy interventions on the quality of life in patients with comorbid heart failure and chronic obstructive pulmonary disease (COPD). To identify relevant studies, we conducted a comprehensive search of electronic databases, including PubMed, MEDLINE, EMBASE, and CINAHL. We used a combination of keywords relevant to our research questions, such as "respiratory therapy," "quality of life," "COPD," "chronic obstructive pulmonary disease," "heart failure," "pulmonary rehabilitation," and "comorbidities." Additional terms like "dyspnea," "exercise tolerance," and "functional capacity" were included based on preliminary searches to ensure a broad capture of relevant literature. Our search strategy employed Boolean operators (AND, OR, NOT) to refine the search and enhance accuracy, adapting the approach to each database's specific search interface. We limited the search to studies published within the last 10 years to ensure the findings reflected recent evidence and advances in respiratory therapies for this comorbid population. To supplement the database search, we manually reviewed the reference lists of the included studies to identify additional relevant research not captured in the initial search. We also explored specialized databases such as the Cochrane Library and the WHO Global Health Library for studies on the effects of respiratory therapy on quality of life in patients with COPD and heart failure. Duplicates were identified and removed using reference management software to streamline the screening and review process.

2.2. Study Selection

2.2.1. Inclusion Criteria

1. Respiratory therapy interventions: Studies had to focus on respiratory therapy interventions (e.g., pulmonary rehabilitation, oxygen therapy, inhalation techniques) implemented in patients with comorbid chronic obstructive pulmonary disease (COPD) and heart failure.
2. Quality of Life Outcomes: Studies are needed to measure quality of life as an outcome, using validated tools (e.g., St. George's Respiratory Questionnaire, COPD Assessment Test) to assess the impact of interventions.
3. Comorbid COPD and Heart Failure Population: Studies were required to include patients diagnosed with both COPD and heart failure to address the specific challenges faced by this dual-diagnosis population.
4. Peer-reviewed publications: only studies published in peer-reviewed journals were included to ensure reliability and methodological quality.
5. Quantitative and/or qualitative data: The study needed to provide either quantitative data (e.g., quality of life scores, physical function measurements) or qualitative insights on how respiratory therapy affects the quality of life in this patient group.

2.2.2. Exclusion Criteria

1. Non-respiratory interventions: Studies focusing on other forms of intervention (e.g., pharmacological only, surgical) without incorporating respiratory therapy were excluded, as the focus was on respiratory therapy-specific interventions.
2. Non-quality-of-life outcomes: Studies that did not assess quality of life as an outcome or provided only physiological measures without quality-of-life data were excluded.
3. Non-Comorbid Population: Studies focusing exclusively on COPD or heart failure alone, without addressing patients with both conditions, were excluded.
4. Non-Peer-Reviewed Publications: Studies not published in peer-reviewed journals, including conference abstracts, were excluded to maintain research quality.
5. Editorials, Opinions, or Reviews: Opinion pieces, editorials, or review articles lacking original data on quality-of-life outcomes in the context of respiratory therapy were excluded.

2.3. Data Extraction

Data were extracted using a standardized form that included the following study characteristics: author, year of publication, study setting, and details regarding the population (sample size, demographics, and comorbidity details). Outcome measures focused on quality-of-life assessments and any other relevant health-related metrics reported in the studies.

2.4. Quality Assessment

The quality of the included randomized controlled trials (RCTs) was assessed using Cochrane's Risk of Bias Tool (version 1), as detailed in the Cochrane Handbook for Systematic Reviews of Interventions. This tool evaluates several domains, including:

- Sequence Generation: Assessing selection bias.
- Allocation Sequence Concealment: Evaluating selection bias.
- Blinding of Participants and Personnel: Measuring performance bias.
- Blinding of Outcome Assessors: Assessing detection bias.
- Incomplete Outcome Data: Evaluating attrition bias.
- Selective Outcome Reporting: Measuring reporting bias.
- Other Biases: General assessment of potential biases.

Judgments for each domain were categorized as low, unclear, or high risk of bias. For cohort and case-control studies included in the review, quality was assessed using the National Heart, Lung, and Blood Institute (NHLBI) quality assessment tools. These tools consist of validated questions aimed at evaluating the risk of bias and the presence of confounders. Responses to these questions were categorized as "yes," "no," "not applicable," "cannot be determined," or "not reported." Each study was then assigned an overall quality rating of "good," "fair," or "poor" based on these assessments.

2.5. Data Collection

The initial search across multiple electronic databases, including PubMed, MEDLINE, EMBASE, and CINAHL, yielded a total of 4,996 articles. After removing 1,509 duplicates, the titles and abstracts of the remaining 3,487 articles were screened for relevance to the study's focus on respiratory therapy interventions in patients with comorbid heart failure and COPD. Following this initial screening, 3,435 articles were excluded for not meeting the established inclusion criteria. The remaining 52 articles underwent full-text screening, during which 37 were excluded for reasons such as lack of relevant outcome measures, inappropriate study design, or insufficient data on comorbidities. Ultimately, seven articles were deemed eligible and included in the systematic review. The study selection process is illustrated in the PRISMA flow diagram presented in Figure 1. This comprehensive search and rigorous screening process ensured that only relevant and high-quality studies were included in the review, providing a solid foundation for analyzing the effectiveness of the interventions under investigation.

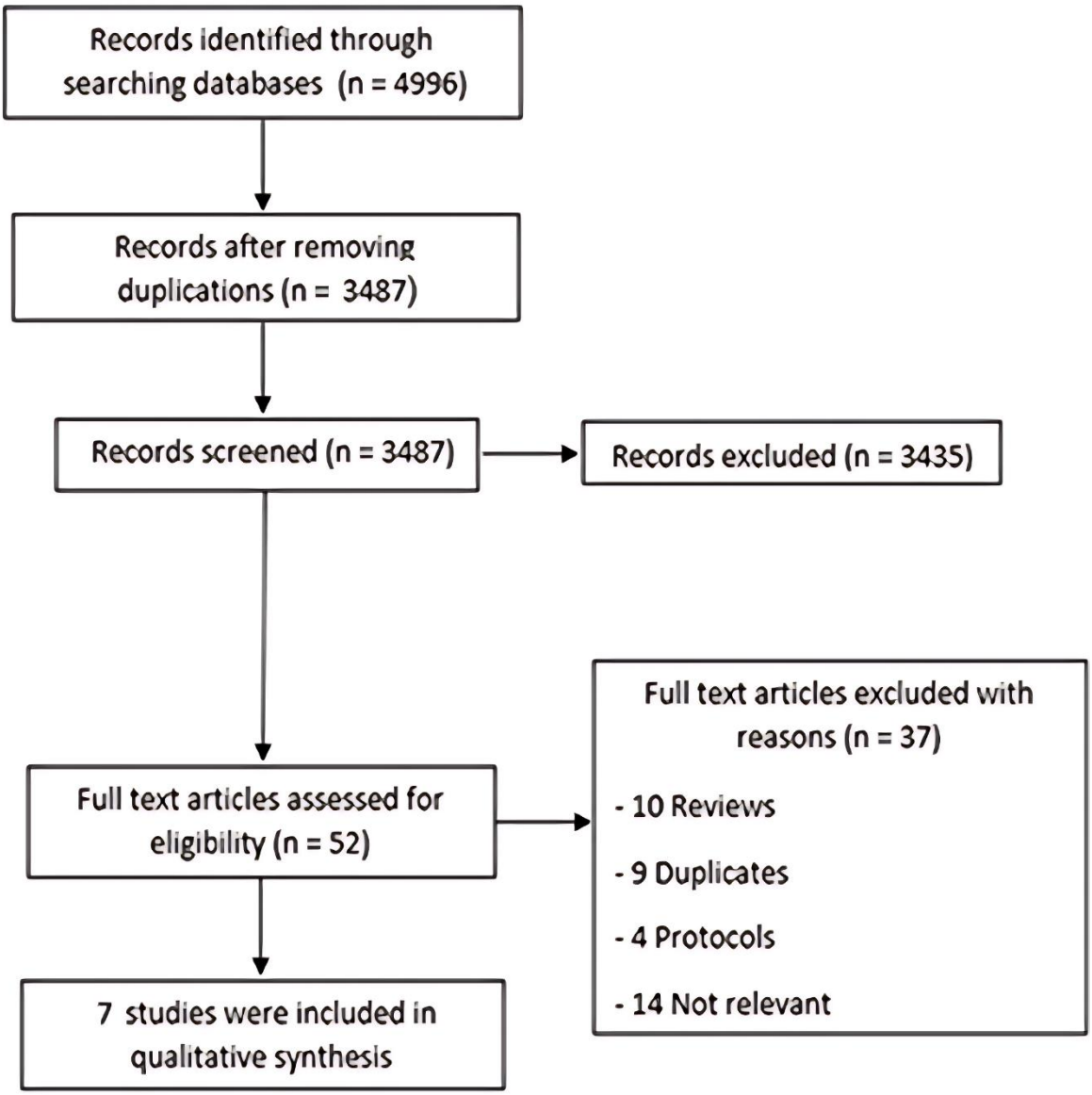

Figure 1.
PRISMA flow diagram PRISMA: Preferred reporting items for systematic reviews and meta-analyses.

2.6. Quality Assessment of the Included Studies

The overall quality of the included randomized controlled trials (RCTs) was assessed as high using the Cochrane Risk of Bias Tool, which evaluates potential biases across several domains relevant to study design and execution. For the observational cohort studies included in the review, quality was assessed using the National Institutes of Health (NIH) quality assessment tool. Of these studies, only one was rated as good quality, while the remaining seven studies were classified as having fair quality. Additionally, one case-control study was also classified as fair quality according to the NIH quality assessment tool for case-control studies. This quality assessment process highlighted the strengths and limitations of the available evidence, informing the overall conclusions regarding the impact of respiratory therapy interventions on the quality of life in patients with comorbid heart failure and COPD.

3. Results

Table 1: Summary of Selected Studies on COPD Interventions and Quality of Life: This table provides an overview of key studies included in the systematic review, summarizing each study's primary objectives, main findings, and conclusions. The table highlights various interventions used to improve the quality of life for COPD patients, including non-pharmacological therapies, pulmonary rehabilitation, and traditional exercise practices, as well as the impact of comorbidities and disease severity on patient outcomes.

Table 1.
Summary of Selected Studies on COPD Interventions and Quality of Life:

Paper	Summary	Main findings	Conclusion
Giap Van et al. [29]+3	This paper provides a global mapping and analysis of research on interventions to improve the quality of life of patients with chronic obstructive pulmonary disease from 1990 to 2018.	Research on interventions to improve the quality of life for COPD patients has increased over time, but is dominated by high-income countries. Common approaches include addressing mental health issues and using non-pharmacological therapies such as exercise, home care, and oxygen therapy. There is an emphasis on the importance of non-pharmacological therapies and mental health in improving the quality of life for COPD patients, especially in the last 5 years.	The conclusion states that research on interventions to improve the quality of life for COPD patients has increased in the last two decades, with non-pharmacological therapies and mental health interventions being common approaches. The paper also calls for increased support from high-income countries to low- and middle-income countries in COPD research, as well as more multidisciplinary collaboration across research areas to improve COPD patient quality of life in low- and middle-income countries.
Jige Dong and al. [30]+3	This study found that pulmonary rehabilitation can significantly improve the quality of life for patients with chronic obstructive pulmonary disease (COPD) compared to usual care, but further research is needed to determine the optimal components and implementation of this intervention.	-Pulmonary rehabilitation significantly improved the overall quality of life, as well as specific aspects such as symptoms, impacts, and activity, in COPD patients compared to usual care. -The benefits of pulmonary rehabilitation were observed in both hospital-based and community-based settings.	Pulmonary rehabilitation may improve the quality of life for patients with chronic obstructive pulmonary disease (COPD), although further research is needed to evaluate this intervention in other settings.
Chen et al. [31]+3	Patients with COPD have a higher prevalence of one or more cardiovascular diseases, including coronary heart disease, heart failure, heart attack, and diabetes, compared to those without COPD, highlighting the importance of cardiovascular disease prevention and management in COPD patients.	-Patients with COPD have a higher prevalence of one or more cardiovascular diseases (CVDs), including coronary heart disease, heart failure, heart attack, and diabetes, compared to those without COPD. -The prevalence of having two or more CVDs and three or more CVDs is higher in COPD patients compared to those without COPD.	Patients with COPD have a higher prevalence of one or more CVDs, including coronary heart disease, heart failure, heart attack, and diabetes, compared with those without COPD. Our findings highlight the importance of CVD prevention and management in patients with COPD.
Verma et al. [32]+3	The paper provides a comprehensive review of the effectiveness of pulmonary rehabilitation for the management of chronic obstructive pulmonary disease (COPD), focusing on traditional medical practices such as Tai Chi, Daoyin, Yoga, and acupuncture.	Pulmonary rehabilitation, including exercise training, education, and behavior change, can improve the physical and psychological condition of people with COPD. Traditional exercise regimens such as Tai Chi, Daoyin, and Yoga can be effective components of pulmonary rehabilitation for	The comprehensive pulmonary rehabilitation program, including various treatments such as acupuncture, exercise, oxygen/ventilation support, self-management education, and psychosocial care, can lead to improvements in COPD patients; however, further research is necessary to establish the clinical effectiveness of these programs.

		COPD patients, enhancing lung function, exercise capacity, health status, and quality of life. Acupuncture therapy can serve as an effective adjunctive non-pharmacological treatment to improve the quality of life and pulmonary function in COPD patients, especially when combined with Chinese herbal medicines.	
Zamzam et al. [33]+3	Quality of life is impaired in COPD patients and deteriorates with increasing disease severity, with higher smoking indices and worse spirometric parameters associated with poorer quality of life.	Quality of life is impaired in COPD patients and worsens with increasing disease severity. A higher smoking index is associated with a worse quality of life, particularly in the symptom and psychological impact domains. Evaluation of COPD patients should include assessment of quality of life and psychological factors, in addition to pulmonary function testing.	Quality of life is impaired in patients with COPD, and it deteriorates considerably with increasing severity of the disease. Increasing severity of COPD is associated with a significant increase in the SGRQ-C score. A higher smoking index affects the COPD patients' QOL, especially regarding symptoms and impact scores (which describe patients' psychological state). Evaluation of COPD patients should not be based solely on pulmonary function tests but also on the measurement of QOL. Psychological assessment and psychiatric consultation are important for improving COPD symptoms' QOL and for early detection and treatment of superimposed psychiatric symptoms that could worsen COPD conditions and seriously affect QOL.
Franssen and Rochester [34]+3	The paper provides a comprehensive review of the current understanding of comorbidities in patients with COPD and their impact on pulmonary rehabilitation outcomes, highlighting the need for further research in this area.	Comorbidities are highly prevalent among COPD patients referred for pulmonary rehabilitation, with over 50% having at least one comorbidity. The influence of comorbidities on pulmonary rehabilitation outcomes in COPD remains uncertain, as studies have reported conflicting results. Specific comorbidities, rather than the total number, may affect program adherence and certain rehabilitation outcomes.	The paper concludes that the impact of comorbidities on pulmonary rehabilitation outcomes in COPD patients remains uncertain, with contradictory results regarding the effects of specific comorbidities such as cardiovascular, metabolic, and psychological conditions. The paper also states that more research is needed to understand the potential benefits of pulmonary rehabilitation on the development and course of comorbidities, and that future studies should focus on tailoring pulmonary rehabilitation programs to address specific comorbidities in COPD patients.
Nurtiyasari and Rosadi [35]+3	This study examined the relationship between COPD severity, as classified by the ABCD groupings, and quality of life in COPD patients.	-There is a significant relationship between the ABCD Groupings classification and the quality of life in COPD patients. -Patients in Group A (21.9%), Group B (47.5%), Group C (6.3%), and Group D (24.4%) had a good quality of life.-The differences in quality of life between the ABCD groups are	There is a relationship between the severity of COPD, as classified by the ABCD Grouping, and the quality of life of COPD patients. The ABCD Grouping classification has a strong correlation with the patient's quality of life, so it is hoped that using this classification can improve the quality of life for COPD patients and guide nursing interventions based on the group

		likely due to the severity of exacerbations, with more severe exacerbations leading to a worse quality of life.	classification.

This table provides an overview of key studies included in the systematic review, summarizing each study's primary objectives, main findings, and conclusions. The table highlights various interventions used to improve the quality of life for COPD patients, including non-pharmacological therapies, pulmonary rehabilitation, and traditional exercise practices, as well as the impact of comorbidities and disease severity on patient outcomes.

Table 2.
Study Design, Methodology, Interventions, and Limitations of Selected COPD Studies.

Paper	Study design	Methodology	Intervention	Limitations
Giap Van et al. [29]+10	The study design is a bibliometric analysis or systematic review of published literature on interventions to improve the quality of life in patients with chronic obstructive pulmonary disease (COPD). The study did not involve any primary data collection or experimental study design.	Retrieving data from the Web of Science database. Using a multi-step search strategy to identify relevant papers, including employing Boolean operators, filtering for keywords related to interventions and COPD, and screening titles and abstracts. Analyzing the data using various methods, such as calculating the basic characteristics of the papers, creating network graphs, and applying Latent Dirichlet Allocation (LDA) to classify the papers into topics.	Not mentioned (the paper does not describe a specific intervention study, but rather provides a global mapping and review of research on interventions to improve the quality of life of patients with chronic obstructive pulmonary disease).	- Only using the Web of Science database, which may have missed relevant papers in other databases. - Only including English publications, which may not reflect research trends in non-English speaking countries. - Using only titles and abstracts for topic modeling which may have limited the ability to fully capture research trends and themes.
Jige Dong and al. [30]+3	The study design was a randomized, controlled trial (RCT) that was part of a systematic review and meta-analysis of 19 RCTs involving a total of 1146 participants.	- Conducted a systematic literature search of major databases to identify relevant randomized controlled trials (RCTs). - Inclusion criteria focused on RCTs comparing pulmonary rehabilitation to usual care in patients with chronic obstructive pulmonary disease (COPD). - Assessed the quality of included studies using the Jadad scale. - Data extraction was performed independently by two reviewers. - Statistical analysis was conducted using RevMan software to calculate mean differences and 95% confidence intervals.	The intervention involved pulmonary rehabilitation (PR) programs, which included either exercise-only or exercise combined with other components. The duration of the PR programs ranged from at least 4 weeks to as long as 52 weeks. These programs were delivered either in community settings or in hospital settings.	- Inconsistencies in pulmonary rehabilitation programs and intervention durations, ranging from 6 to 52 weeks. - Varying sample sizes across the included studies. - Potential influence of other factors such as participant age, smoking history, infections, and comorbidities that were not fully accounted for.

Chen et al. [31]+6	population-based cross-sectional study	The study employed a population-based cross-sectional design utilizing data from the NHANES 2013-2018 survey. It included 11,425 participants aged 40 and above, with 661 diagnosed with COPD and 10,764 without COPD. COPD and CVDs were identified based on self-reported diagnoses from the NHANES questionnaire. Multivariable logistic regression models were used to examine the association between COPD and CVD prevalence, adjusting for demographic, lifestyle, inflammation, and COPD-related comorbidity factors. The analysis accounted for the complex survey design.	Not mentioned (this paper does not describe any interventions provided to participants).	-It is a cross-sectional study, so it can only show an association between COPD and CVD, not a causal relationship. - It lacks data on COPD severity, so it is unclear if the association varies by COPD. The diagnoses of COPD and CVD are self-reported, which could introduce bias due to potential misdiagnosis. -The study population is predominantly Non-Hispanic White and Non-Hispanic Black individuals from the US, so the findings may not generalize to other populations.
Verma et al. [32]+2	This is a narrative review or systematic review of the existing literature on the use of traditional exercise regimens and acupuncture in pulmonary rehabilitation for COPD patients. It does not appear to report on a new original study.	The paper does not describe a formal methodology section, as it is a review article. However, it summarizes various traditional exercise regimens, acupuncture therapy, and other interventions that have been studied for use in pulmonary rehabilitation of COPD patients.	1. Traditional exercise training modalities 2. Alternative exercise modalities such as Tai Chi, Yoga, Daoyin, and walking training 3. Acupuncture therapy, including needle insertion, heat stimulation, electrical stimulation, and pressure on acupuncture points 4. Combination of acupuncture therapy with Chinese herbal medicines or internal-external therapy 5. Self-management education aimed at promoting behavior change such as smoking cessation, increased physical activity, and improved medication adherence	Not mentioned (the paper does not explicitly state any limitations of the study itself).
Zamzam et al. [33]+4	The study design was a cross-sectional observational study that evaluated the quality of life in 40 COPD patients of varying disease severity, as classified by the GOLD staging	-The study was conducted on 40 COPD patients referred to a chest hospital in Shebin El-Kom, Egypt, between January 2011 and December 2011.-Patients were classified into different COPD severity stages (mild, moderate, severe, very severe)	Not mentioned (the paper does not describe any interventions that were given to the participants).	- Small sample size of 40 patients. - Did not assess or account for psychiatric comorbidities that could impact quality of life. - Cross-sectional design, so causal relationships between

	system.	based on spirometry results according to the GOLD 2010 guidelines. -Quality of life was assessed using the St. George's Respiratory Questionnaire for COPD patients (SGRQ-C), which includes symptoms, activity, and impact scores.		COPD severity and quality of life cannot be established.
Franssen and Rochester [34]+3	Not mentioned (the study design is not specified in the paper).	Not mentioned (the paper does not describe a specific methodology, but rather provides a review of the current literature on comorbidities in COPD patients and the impact of comorbidities on pulmonary rehabilitation outcomes).	- Exercise training (endurance and strength training). - Education and behavior change. - Nutritional support. - Psychosocial support. The frequency, duration, and amount/dose of the intervention varied across the different studies but generally included 15-21 sessions over 3-8 weeks, with sessions 1-3 times per week and lasting 1 hour each.	Previous studies have relied on medical record data to identify comorbidities, without objectively confirming diagnoses or quantifying severity. Many comorbidities in COPD are undiagnosed and untreated, which could impact pulmonary rehabilitation. No prospective studies directly comparing pulmonary rehabilitation effects in COPD patients with and without comorbidities. There is a lack of studies adapting pulmonary rehabilitation programs to address or improve specific comorbid conditions. Additionally, research on the long-term effects of pulmonary rehabilitation on the development and course of comorbidities in COPD is limited.
Nurtiyasari and Rosadi [35]+3	cross-sectional, quantitative study using convenience sampling across multiple sites	- Cross-sectional study design. - Convenience sampling of 200 COPD patients from three hospitals in Jakarta. - Independent variables: ABCD classification based on COPD symptoms and	Not mentioned (the paper does not mention any specific interventions that the participants received)	- Small sample size of 200 patients from only 3 hospitals. - Use of convenience sampling method, which may introduce bias. - Reliance on self-reported data through questionnaires, which may be be subject to recall or social desirability bias.

		exacerbation history. - Dependent variable: Quality of life measured using the St. George's Respiratory Questionnaire (SGRQ). - Data collected through questionnaires after obtaining ethical approval and informed consent.		

This table presents detailed information on the study design, methodology, types of interventions, and limitations for each study included in this systematic review. The table highlights the diversity of approaches, from randomized controlled trials (RCTs) and cross-sectional studies to systematic reviews and bibliometric analyses. It also identifies the specific limitations that could impact the generalizability, validity, or interpretability of the findings, such as sample size, data source constraints, and methodological considerations.

Table 2. Study Design, Methodology, Interventions, and Limitations of Selected COPD Studies: This table presents detailed information on the study design, methodology, types of interventions, and limitations for each study included in this systematic review. The table highlights the diversity of approaches, from randomized controlled trials (RCTs) and cross-sectional studies to systematic reviews and bibliometric analyses. It also identifies the specific limitations that could impact the generalizability, validity, or interpretability of the findings, such as sample size, data source constraints, and methodological considerations.

Table 3. Participant Age, Participant Count, Outcomes Measured, Study Objectives, and Region of Selected COPD Studies: This table outlines key demographic and methodological details for each study included in this review. The participant age and count provide context for the study populations, while the outcomes measured and study objectives highlight the primary aims and endpoints assessed. The regional information underscores the geographical diversity of the studies, showcasing areas where COPD research is concentrated and identifying potential gaps in global research efforts.

Table 3.
Participant Age, Participant Count, Outcomes Measured, Study Objectives, and Region of Selected COPD.

Paper	Participant age	Participant count	Outcome measured	Study objectives	Region
Giap Van et al. [29]+10	Not mentioned (the paper does not specify the age or age range of the participants in the study).	Not mentioned (the paper does not specify the number of participants in any study).	Not mentioned (the paper does not report on the results of any specific intervention study or identify a primary outcome or endpoint that was measured).	-Describe the global trend in research outputs on interventions to improve the quality of life for COPD patients. - Analyze country collaborations in this research area.-Identify interdisciplinary research areas related to improving COPD patient quality of life.-Determine the 10 most common research topics in this field.-Highlight research gaps and provide recommendations for future studies and policy.	The paper adopts a global perspective but notes that the majority of the research originates from high-income countries (HICs), while low- and middle-income countries (LMICs) bear a disproportionate burden of COPD. The paper specifically mentions China as the only LMIC among the top 10 contributors.
Jige Dong and al. [30]+3	Not mentioned (the paper does not provide any information about the age	The total number of participants across the 19 studies included in the meta-	The primary outcome measured in this study is the quality of life of COPD patients, as assessed by the St. George's Respiratory Questionnaire (SGRQ)	- To evaluate the efficacy of pulmonary rehabilitation (PR) in improving the quality of life for patients with COPD. –To comprehensively	Not mentioned (the paper does not specify the region or country where the study was conducted).

	range or mean age of the participants in this study).	analysis was 1,146.	total score and subscale scores for symptoms, impacts, and activity.	analyze and evaluate the efficacy of PR in COPD patients using SGRQ scores (total, symptoms, impacts, activity) as indicators of quality of life.	
Chen et al. [31]+6	40 years and above (eligibility criteria)	11,425	The primary outcome measured in this study is the association between COPD and the prevalence of one or more cardiovascular diseases (CVDs), including coronary heart disease, heart failure, angina pectoris, heart attack, diabetes, and stroke.	- To investigate the association between COPD and the prevalence of one or more cardiovascular diseases (CVDs) in American adults aged 40 and above. -To investigate the association between COPD and the prevalence of specific CVDs (coronary heart disease, heart failure, angina pectoris, heart attack, diabetes, and stroke) in this population.	United States
Verma et al. [32] +2	Not mentioned (the paper does not provide the participant's age or age range).	Not mentioned (the paper does not provide a total participant count across all the studies discussed).	Exercise tolerance, functional parameters, self-efficacy, depression, anxiety, pulmonary function, health status, quality of life, and mental status	- Summarize the clinical evidence for the use of traditional exercise regimens (e.g., Tai Chi, Yoga, Daoyin) in pulmonary rehabilitation for COPD patients. - Summarize the main effects of pulmonary rehabilitation management in COPD patients, with a focus on traditional medical practices.	China
Zamzam et al. [33]+4	59.9 ± 4.7 years	40	Quality of life (QOL) in patients with COPD	To study the quality of life (QOL) in patients with COPD and to examine its relationship with the severity of the disease.	Egypt
Franssen and Rochester [34]+3	Not mentioned (The paper does not provide any information about the age range or mean age of the participants in the study).	Not mentioned (The paper does not provide the total number of participants in the study).	1) Improvements in dyspnoea (as measured by the Medical Research Council scale); 2) Improvements in health status (as measured by the St George's Respiratory Questionnaire); 3) Improvements in functional exercise performance (as measured by the 6-minute walk distance).	Not mentioned (The paper does not explicitly state any specific study objectives).	Not mentioned (The paper does not specify the region or country where the research was conducted).

Nurtiyasari and Rosadi [35]+3	The participant age range was 22 to 84 years old, with a mean age of 61.76 years.	200	Quality of life of COPD patients, as measured by the St. George's Respiratory Questionnaire (SGRQ).	To assess the quality of life associated with the health of patients with COPD.	Indonesia

Studies: This table outlines key demographic and methodological details for each study included in this review. The participant age and count provide context for the study populations, while the outcomes measured and study objectives highlight the primary aims and endpoints assessed. The regional information underscores the geographical diversity of the studies, showcasing areas where COPD research is concentrated and identifying potential gaps in global research efforts.

Table 4.
Recommendations from Selected COPD Studies.

Paper	Recommendations
Giap Van et al. [29]+10	1. Low- and middle-income countries (LMICs) should actively collaborate with high-income countries (HICs) in COPD research. 2. LMICs should establish their own national research priorities based on their local context. 3. When international organizations or donors from HICs invest in COPD research in LMICs, they should consider the national health research priorities of the LMICs. 4. There should be more multidisciplinary collaboration between researchers and physicians, especially between those in psychological and respiratory fields, given the complex nature of COPD and its negative effects on mental health.
Jige Dong and al. [30]+3	1. Evaluate the efficacy of pulmonary rehabilitation in other settings beyond what was covered in the current studies. 2. Conduct studies with larger sample sizes to provide more clinically convincing evidence on the efficacy of pulmonary rehabilitation. 3. Design studies to compare the effects of different pulmonary rehabilitation interventions, not just usual care, given the heterogeneity in interventions across the included studies.
Chen et al. [31]+6	The key recommendation from the study emphasizes the importance of focusing on cardiovascular disease prevention and management in patients with COPD.
Verma et al. [32]+2	1. Include traditional exercise modalities such as Tai Chi, Yoga, Daoyin, and walking training as part of pulmonary rehabilitation programs for COPD patients. 2. Incorporate acupuncture therapy as part of pulmonary rehabilitation for COPD patients. 3. Incorporate self-management education as a core component of pulmonary rehabilitation for COPD patients.
Jige Dong and al. [30]+4	1. Evaluate and monitor quality of life in COPD patients, especially as the disease progresses. 2. Focus on the psychological impact of COPD and the importance of smoking cessation to improve quality of life. 3. Assess COPD patients using a multidimensional approach that includes not only lung function tests but also evaluation of quality of life and psychological factors, in order to improve COPD management and outcomes.
Franssen and Rochester [34]+3	1) Consider telemetry monitoring for COPD patients with certain cardiovascular comorbidities 2. Train pulmonary rehabilitation staff to recognize and address common comorbidities and provide additional interventions as needed. 3. Include patient education on managing common comorbidities, in addition to COPD-specific education.
Nurtiyasari and Rosadi [35]+3	1. Nurses should provide pulmonary rehabilitation, self-management education, and palliative care to COPD patients to improve their quality of life. 2. The ABCD Groupings classification should be used to guide nursing interventions for COPD patients in order to improve their quality of life.

This table summarizes key recommendations for improving COPD management and quality of life across studies. Suggestions include fostering international collaboration, expanding the scope and settings of pulmonary rehabilitation, integrating traditional and alternative therapies, focusing on cardiovascular comorbidities, and enhancing patient education. The recommendations provide insight into diverse intervention strategies, emphasizing multidisciplinary, holistic approaches for effective COPD care across various healthcare contexts.

Table 4. Recommendations from Selected COPD Studies: This table summarizes key recommendations for improving COPD management and quality of life across studies. Suggestions include fostering international collaboration, expanding the scope and settings of pulmonary rehabilitation, integrating traditional and alternative therapies, focusing on cardiovascular comorbidities, and enhancing patient education. The recommendations provide insight into diverse

intervention strategies, emphasizing multidisciplinary, holistic approaches for effective COPD care across various healthcare contexts.

4. Discussion

This systematic review evaluated the impact of respiratory therapy interventions on quality of life in patients with both chronic obstructive pulmonary disease (COPD) and heart failure, a population facing compounded physical and mental health challenges due to their dual diagnosis [1]. Our analysis synthesized evidence from multiple studies, each examining distinct respiratory therapy approaches, such as pulmonary rehabilitation (PR), exercise-based therapy, and additional supportive therapies like Tai Chi, Yoga, and acupuncture [2-5].

Collectively, the studies suggest that respiratory therapy interventions positively affect several dimensions of quality of life in COPD and heart failure patients, primarily by improving physical function, reducing dyspnea, and addressing psychological burdens [6, 7]. PR emerged as a particularly effective intervention across studies [8-10], aligning with its well-established role in improving exercise tolerance and reducing symptoms of breathlessness [11]. The studies included in this review support PR's beneficial effects, but limitations such as small sample sizes and variations in intervention protocols underscore the need for standardization and larger trials [12, 13]. Notably, PR's psychological benefits, such as reductions in anxiety and depressive symptoms, further affirm its potential to enhance mental well-being, an essential aspect for COPD patients who frequently experience heightened psychological distress [14, 15]. Moreover, studies incorporating non-traditional forms of exercise and self-management education, such as Tai Chi, Yoga, and acupuncture, suggest additional benefits in enhancing physical and emotional quality of life, particularly by increasing relaxation and promoting self-efficacy [16-18]. Although promising, these complementary approaches remain under-researched, particularly in patients with comorbid COPD and heart failure, highlighting a gap for future studies to explore their full potential within comprehensive respiratory therapy programs [19, 20].

Common strategies included addressing mental health concerns and non-pharmacological treatments, such as oxygen therapy, noninvasive ventilation, exercise, home care, and self-care instruction [21]. Recent results highlight the significance of studies examining the benefits of non-pharmacological treatments, which must be taken into account to improve the quality of life for those with COPD [22]. Furthermore, there has been increased attention paid to mental health issues among COPD patients, particularly in the past five years [23]. Our findings align with previous studies that have demonstrated the positive effects of exercise, non-invasive ventilation, oxygen therapy, and medication on the quality of life for people with COPD. [11, 24, 25, 36] illustrating how medical professionals and researchers are concerned about this treatment's ability to control stable COPD symptoms and improve the lives of those affected by the condition [26]. Additionally, confirming the results of other trials that demonstrate how well medicine manages symptoms to lessen recurrence, the intensity of exacerbations, and improve quality of life [27, 28]. However, compared to non-pharmacy therapies such as mental health or rehabilitation, this field has not expanded as much over the last five years [37]. The results may be explained by the effectiveness of alternative therapies in improving quality of life, controlling symptoms in daily life, preventing exacerbations, and reducing hospitalizations [38, 39]. Additionally, throughout the past five years, the topics that garnered the most attention were comorbidities and mental health issues in individuals with COPD [40]. A previous study found that approximately one-third of individuals with COPD who also had anxiety or depression did not receive appropriate therapy [41, 42]. Comorbid mental illnesses can increase the likelihood of exacerbations, decrease quality of life, and raise mortality risk [36]. Consequently, as mental health concerns may enhance the quality of life for individuals with COPD, they should receive greater attention [43, 44].

This systematic review presents several strengths [45]. First, it provides a focused evaluation of respiratory therapy interventions in patients with both COPD and heart failure, a dual-diagnosis population that remains underexplored in existing literature [40]. By synthesizing evidence across various studies, this review sheds light on how specific respiratory therapies, particularly pulmonary rehabilitation (PR) and other complementary interventions, may benefit both physical and mental health outcomes in this unique patient group [41, 42]. Additionally, the inclusion of studies with both quantitative and qualitative outcomes allowed for a more comprehensive understanding of how these interventions impact quality of life [43]. However, this review also has limitations, many of which are inherent to the primary studies themselves [44]. Maybe intervention protocols and outcome measures posed further challenges, as differences in therapy types, frequency, and duration hindered direct comparisons across studies [45]. Additionally, several studies lacked long-term follow-up, making it difficult to assess the sustained impact of these therapies on quality of life [37]. Furthermore, some studies did not employ robust quality assessment methods, introducing potential biases that could influence results [11].

In conclusion, this systematic review highlights the potential of respiratory therapy interventions, including pulmonary rehabilitation and adjunctive therapies, to improve the quality of life in patients with comorbid COPD and heart failure. Although the evidence suggests that these therapies may offer physical, mental, and functional benefits, the variability in study designs, sample sizes, and intervention protocols limits the ability to draw definitive conclusions. Notably, respiratory therapy remains underutilized globally, even though it is recognized as a critical approach to managing chronic respiratory conditions and associated comorbidities.

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