

THERAPEUTIC ROLE OF YOGA IN PULMONARY REHABILITATION: A REVIEW OF CLINICAL EVIDENCE

Anna Kaźmierska¹  , **Magdalena Boderka²** ,
Anna Chudyba³ , **Krzysztof Blaut⁴** ,
Anna Hamerla² , **Dariusz Jastrzębski²** ,
Szymon Skoczyński² 

¹Department of Cardiology and Structural Heart Diseases, Medical University of Silesia, Katowice, Poland

²Department of Lung Diseases and Tuberculosis, Medical University of Silesia, Katowice, Poland

³Provincial Psychiatric Hospital in Andrychów, Poland

⁴Department of Computer Science, University of Economics in Katowice, Poland



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 ania.kazmierska43@gmail.com

ABSTRACT

BACKGROUND

Chronic respiratory diseases such as chronic obstructive pulmonary disease and asthma remain a major cause of functional limitation and reduced quality of life. Although pulmonary rehabilitation is an established component of management, many patients continue to experience persistent symptoms and impaired exercise tolerance. This has stimulated interest in complementary nonpharmacological interventions that may enhance rehabilitation outcomes.

AIM OF THE STUDY

To evaluate the therapeutic role of yoga as an adjunctive intervention in pulmonary rehabilitation, with a focus on clinical outcomes, functional effects, and psychophysiological aspects.

MATERIAL AND METHODS

A narrative review of the clinical literature was performed using the PubMed and Google Scholar databases. Publications published between 2015 and 2025 in English and Polish were analyzed. Randomized controlled trials, meta analyses, systematic reviews, and observational studies investigating the effects of yoga based interventions on respiratory function, exercise capacity, symptoms, and quality of life in patients with respiratory diseases were included.

RESULTS

Analysis of the reviewed studies indicates that yoga based interventions are associated with improvements in selected parameters of pulmonary function, respiratory muscle performance, and exercise tolerance. Reductions in symptom burden, particularly dyspnea and fatigue, as well as improvements in quality of life and psychological well being, were

reported across several respiratory conditions, most consistently in chronic obstructive pulmonary disease and asthma. Evidence in lung cancer and obstructive sleep apnea syndrome suggests potential benefits in specific functional and psychosocial outcomes, although data are more limited.

CONCLUSIONS

Current clinical evidence suggests that yoga may serve as a complementary component of pulmonary rehabilitation when used alongside standard therapy. While positive effects on functional and symptom related outcomes have been reported, heterogeneity of interventions and study designs warrants cautious interpretation. Further well designed clinical studies are needed to better define the role of yoga within pulmonary rehabilitation programs.

Keywords: yoga, pulmonary rehabilitation, chronic respiratory diseases, exercise tolerance, quality of life

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INTRODUCTION

Yoga is a structured mind-body intervention that integrates physical postures (asanas), breathing techniques (pranayama), meditation, and relaxation practices. Today it is widely used as a therapeutic intervention supporting both physical and mental health [1]. Increasing evidence indicates that yoga may have measurable benefits for respiratory function and may therefore be relevant in populations with impaired pulmonary health [2].

Breathing regulation is a central component of yoga. Pranayama trains conscious and controlled breathing, engages the respiratory musculature, and improves ventilation and breathing mechanics [2]. These techniques also modulate autonomic nervous system activity, contributing to reductions in stress and sympathetic arousal [3]. Because psychological stress frequently exacerbates respiratory symptoms and promotes shallow, inefficient breathing, its reduction is of particular importance in patients with chronic lung diseases [4,5].

Yoga has shown therapeutic potential across several clinical populations. In oncology, yogic breathing techniques may reduce fatigue and anxiety and improve respiratory parameters [6]. Early evidence in chronic obstructive pulmonary disease (COPD) suggests that yoga can enhance lung function and decrease symptom burden [7]. Similar improvements have been reported in patients with cardiovascular disease, in whom yoga increased lung volumes and diffusion capacity [8].

Pulmonary rehabilitation is a cornerstone of management in chronic respiratory diseases. Yet many patients continue to experience dyspnea, reduced exercise tolerance, and impaired quality of life despite optimized medical therapy. This has led to growing interest in complementary approaches such as yoga. Existing studies indicate that yoga may improve exercise capacity, reduce symptom severity, and enhance health-related quality of life in patients with chronic pulmonary conditions [9,10]. Systematic reviews further support its usefulness in reducing dyspnea and improving functional performance [11,12].

Yoga represents a promising adjunct to standard pulmonary rehabilitation. It combines respiratory training with physical activity and psychophysiological regulation. Its adaptability to individual functional limitations and favorable safety profile support its use in clinical practice.

RELEVANCE

Chronic respiratory diseases remain one of the leading causes of reduced functional status and quality of life in patients [9,11,12]. Despite the widespread implementation of pulmonary rehabilitation programs, a substantial proportion of patients continue to experience dyspnea, limitations in physical activity, and psychoemotional disturbances [11]. In recent years, interest has increased in nonpharmacological interventions capable of influencing respiratory mechanics, exercise tolerance, and psychological state simultaneously [3,13]. Yoga is increasingly mentioned in clinical studies across various respiratory conditions, including chronic obstructive pulmonary disease, asthma, and conditions following surgical treatment of lung cancer [7,9,22,25,29,30]. However, the available data remain fragmented and are presented mainly within individual disease categories. A systematic analysis of clinical evidence regarding the use of yoga in the context of pulmonary rehabilitation is therefore of practical interest for clinicians and rehabilitation specialists.

NOVELTY

The novelty of this work lies in the integrative analysis of clinical data on the use of yoga as a component of pulmonary rehabilitation across different respiratory diseases within a single review. The article summarizes the results of randomized clinical trials, meta analyses, and observational studies published between 2015 and 2025 [9,12,22,24,26,27,30,32], with a simultaneous assessment of functional, respiratory, and psychophysiological effects. Particular attention is given to the comparison of clinical outcomes and the proposed physiological mechanisms of yoga action described in studies of respiratory mechanics, autonomic regulation, and psychoemotional responses

[3,12,15,16,18], which allows yoga to be considered not only as a supportive practice but as a structured rehabilitation tool.

AIM AND OBJECTIVES

The aim of the study is to evaluate the therapeutic role of yoga as an additional intervention in pulmonary rehabilitation programs for patients with chronic respiratory diseases.

To achieve this aim, the following objectives were defined.

To analyze clinical studies assessing the effect of yoga on pulmonary function parameters [7,15,25,27].

To evaluate the impact of yoga on physical performance and exercise tolerance in patients with respiratory pathology [22,23,24,30,32].

To summarize data on the effect of yoga on symptom severity, including dyspnea and fatigue [11,22,23,24].

To examine the psychophysiological effects of yoga related to quality of life and psychological well being in patients [3,19,20,30].

To systematize the proposed mechanisms of yoga action in the context of pulmonary rehabilitation based on experimental and clinical studies [12,13,15,16,18].

MATERIAL AND METHODS

This article is a narrative review of the clinical literature addressing the use of yoga in pulmonary rehabilitation. The aim of the review was to summarize and interpret existing clinical evidence rather than to perform a formal systematic synthesis or quantitative meta analysis.

The literature search was conducted in the PubMed and Google Scholar databases. Publications issued between 2015 and 2025 were considered. Only articles published in English or Polish were reviewed. The search strategy was based on combinations of the following keywords: yoga, pulmonary rehabilitation, COPD, asthma, respiratory function, lung cancer, obstructive sleep apnea.

Study selection was guided by the thematic relevance to pulmonary rehabilitation and yoga based interventions. Randomized controlled trials, meta analyses, systematic reviews, and observational studies reporting clinical, functional, or physiological outcomes related to respiratory diseases were considered eligible for inclusion. The selection process was not based on a predefined protocol or flow diagram and did not involve formal quantitative assessment of study quality or risk of bias, in line with the narrative design of the review.

Publications focusing exclusively on non respiratory conditions or lacking clinically relevant respiratory outcomes were not included in the analysis. Case reports, editorials, and conference abstracts without full text were not considered.

The included studies were analyzed qualitatively. Data interpretation focused on patient populations, respiratory diagnoses, types of yoga or breathing interventions, duration of interventions, and reported outcomes such as lung function parameters, exercise tolerance, symptom burden, and quality of life measures. The results were synthesized descriptively, with emphasis on identifying recurring clinical effects and plausible physiological mechanisms of yoga in the context of pulmonary rehabilitation.

RESULTS

MECHANISMS OF ACTION OF YOGA IN PULMONARY REHABILITATION

Yoga may support pulmonary rehabilitation by improving respiratory mechanics and respiratory muscle performance. These effects are primarily mediated through controlled breathing techniques, such as pranayama. Slow and deep breathing patterns improve alveolar ventilation and overall breathing efficiency. This is particularly relevant in obstructive lung diseases, including COPD and asthma [12,13,14,15].

Regular yogic breathing actively engages the diaphragm and intercostal muscles. Over time, this leads to increased respiratory muscle strength and endurance. Stronger respiratory muscles reduce the work of breathing. As a result, patients may experience less dyspnea during physical activity [7,15].

Yoga postures that emphasize thoracic extension improve chest wall mobility. Increased rib cage excursion supports diaphragmatic movement. This facilitates deeper and more efficient breathing. Improved chest wall compliance may therefore contribute to increased lung volumes and better ventilatory capacity [16,17].

Yoga also influences respiratory symptoms through modulation of the autonomic nervous system. Slow and controlled breathing reduces sympathetic activity and enhances parasympathetic tone. This autonomic shift stabilizes breathing

patterns. It may also reduce the subjective sensation of breathlessness [3,11,18].

Psychological effects further support pulmonary rehabilitation outcomes. Breathing and relaxation techniques reduce anxiety associated with dyspnea. Improved confidence in breath control encourages greater participation in physical activity and rehabilitation programs [19,20].

Taken together, these mechanisms provide a biological rationale for integrating yoga into pulmonary rehabilitation. They support the clinical improvements in lung function, exercise tolerance, and symptom burden reported in previous studies [6,12].

Table below analyses impacts of yoga techniques on pulmonary functions

Table 1. Yoga techniques commonly used in pulmonary rehabilitation and their effects on respiratory function [21]

Yoga Technique	Description	Impact on the Respiratory System
Pranayama	Breath control techniques (e.g., Nadi Shodhana, Kapalabhati, Ujjayi)	Increases lung capacity, improves ventilation, reduces stress
Bhujangasana	Cobra pose; opens the chest	Enhances diaphragm flexibility, facilitates deep breathing
Urdhva Dhanurasana	Upward bow pose (wheel pose)	Increases tidal volume, supports ease of breathing
Supta Baddha Konasana	Restorative reclining pose	Relaxes the diaphragm and respiratory muscles
Meditation & Mindfulness	Breath-focused awareness and concentration	Regulates breathing rhythm, reduces tension

CLINICAL EFFECTS OF YOGA IN SELECTED PULMONARY DISEASES

This section reviews clinical evidence supporting the use of yoga as an adjunct to pulmonary rehabilitation in selected respiratory diseases. Disease-specific outcomes related to lung function, exercise capacity, symptoms, and quality of life are summarized.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Current evidence suggests that yoga may provide clinically relevant benefits for patients with COPD by targeting key physiological and functional impairments. A meta-analysis by Zhang et al., including 39 studies and 2,397 participants, demonstrated significant improvements in exercise capacity, with a mean increase of 36.34 m in the six-minute walk test (6MWT; 95% CI 26.51-46.17; $p < 0.001$). Health-related quality of life improved, reflected by a 6.66-point reduction in SGRQ total scores ($p < 0.001$), and dyspnea severity decreased, as shown by a reduction on the mMRC scale (WMD -0.59 ; $p < 0.001$) [22].

Further evidence is provided by a randomized controlled trial by Ranjita et al. involving 72 coal miners with COPD. After a 12-week yoga intervention, dyspnea and fatigue decreased by 24.41% and 25.86%, respectively (both $p < 0.001$). Exercise tolerance improved significantly, with a 19.93% increase in 6MWD in the yoga group compared with 5.39% in the control group ($p = 0.047$). Peripheral oxygen saturation increased (+1.32%; $p < 0.001$), and heart rate decreased (-4.28%; $p < 0.001$), indicating improved cardiopulmonary efficiency [23].

These results are consistent with a 2023 network meta-analysis of 43 randomized controlled trials, which ranked yoga among the most effective breathing-based interventions for improving health-related quality of life and reducing dyspnea. Favorable effects on exercise performance and inspiratory muscle strength were also reported [24].

Overall, current evidence indicates that yoga may positively influence functional capacity, symptom burden, ventilatory mechanics, and quality of life in patients with COPD, supporting its role as a complementary component of pulmonary rehabilitation.

ASTHMA

Asthma is characterized by variable airflow limitation and respiratory muscle dysfunction, making interventions targeting breathing mechanics particularly relevant. Available evidence indicates that yoga may offer therapeutic benefits in this population. A controlled cross-sectional study demonstrated that individuals who regularly practice yoga exhibit significantly better inspiratory muscle characteristics, including greater diaphragmatic thickness at rest (0.26 ± 0.02 cm vs 0.22 ± 0.01 cm) and during maximal inspiration (0.34 ± 0.03 cm vs 0.28 ± 0.03 cm), as well as enhanced contraction dynamics ($p < 0.001$) [16].

Clinical trials further support these findings. In a randomized study of 112 adults, a six-week yoga intervention resulted in significant improvements in pulmonary function, asthma control (ACT), and health-related quality of life (AQLQ), while the control group showed deterioration in all assessed outcomes ($p < 0.05$) [25].

Additional evidence from a meta-analysis of 22 studies involving 2,880 participants demonstrated that breathing exercises, including yogic techniques, improved AQLQ scores, reduced hyperventilation symptoms, and increased FEV₁% predicted [26]. These results are consistent with a second meta-analysis reporting significant improvements in FEV₁, FVC, PEFr, and asthma control [27].

A randomized controlled trial including 140 children with asthma demonstrated statistically significant improvements in FVC, FEV₁, FEV₁/FVC, PEFr, and asthma-specific quality of life (PAQLQ) following a three-month supervised yoga program compared with standard pharmacotherapy alone [28].

Collectively, these findings highlight the potential of yoga to improve lung function, inspiratory muscle strength, symptom control, and quality of life in individuals with asthma.

LUNG CANCER

Yoga-based breathing techniques show promise as a supportive therapy for patients with lung cancer, both before and after surgery. In a randomized trial by Barassi et al., 32 surgical candidates demonstrated significant short-term improvements in spirometric parameters after 7 days of yogic breathing, compared with standard breathing exercises [29].

A meta-analysis by Sun et al., involving 897 patients, found that mind-body exercises, including yoga, improved exercise capacity (6MWD +18.83 m; $p = 0.001$), reduced anxiety (SMD -1.51), and enhanced overall quality of life (SMD 0.71; $p = 0.02$) [30].

Additionally, a randomized trial of 108 postoperative lung cancer patients showed that yoga-based breathing significantly reduced dyspnea and anxiety and improved exercise capacity. The most pronounced benefits were observed in the group receiving yoga combined with a problem-solving model [31].

Altogether, these findings indicate that yoga can play a valuable role in cancer rehabilitation, supporting physical and psychological recovery.

OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS)

Obstructive sleep apnea syndrome (OSAS) is characterized by recurrent episodes of upper airway obstruction during sleep.

These episodes lead to impaired respiratory muscle performance and reduced exercise capacity.

The condition is also associated with cognitive dysfunction and decreased sleep quality.

As a result, OSAS affects both physiological and psychological domains.

Interventions addressing multiple mechanisms may provide additional therapeutic benefits.

Yoga based interventions have been proposed as supportive strategies in the management of OSAS.

Such interventions primarily focus on controlled breathing techniques and relaxation practices.

EVIDENCE SUPPORTS THE POTENTIAL EFFECTIVENESS OF YOGA IN PATIENTS WITH OSAS.

In a randomized controlled trial conducted by Eyüboğlu et al., 44 patients were included [32].

Participants were assigned either to a 12 week tele yoga program or to a control group performing unsupervised thoracic expansion exercises.

The tele yoga group demonstrated significant improvements in inspiratory and expiratory muscle strength assessed by maximal inspiratory pressure and maximal expiratory pressure ($p < 0.05$).

Significant improvements were also observed in cardiopulmonary exercise parameters and cognitive performance ($p < 0.05$).

Sleep related outcomes improved in the yoga intervention group.

Participants showed increased total sleep duration and improved sleep efficiency.

Daytime sleepiness was significantly reduced as assessed by the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale ($p < 0.05$) [32].

No significant changes were observed in the six minute walk test.

This finding suggests that the intervention predominantly affected respiratory function, sleep regulation, and cognitive performance rather than overall physical endurance.

Overall, the available evidence indicates that yoga may serve as a valuable adjunct to standard OSAS treatment strategies.

Telemedicine based delivery may increase accessibility for selected patient populations.

Implementation should be supervised by trained professionals to ensure patient safety and optimal therapeutic outcomes.

DISCUSSION

This narrative review summarizes clinical evidence on the use of yoga as an adjunctive component of pulmonary rehabilitation across different respiratory diseases. Analysis of the included studies indicates that the most consistent and quantitatively supported effects of yoga are observed in patients with chronic obstructive pulmonary disease. Meta analyses and randomized controlled trials demonstrate improvements in exercise tolerance, reductions in dyspnea severity, and improvements in quality of life assessed by standardized instruments such as the SGRQ and mMRC scales [22,23,24]. These findings are consistent with the physiological mechanisms discussed in the article, including enhanced respiratory muscle function and improved ventilatory efficiency [12,15].

In studies involving patients with asthma, improvements in pulmonary function parameters and disease control are reported. Randomized trials and meta analyses show increases in FEV1, FVC, and PEFR, along with improvements in quality of life and asthma control scores [25,26,27,28]. However, many of these studies are characterized by relatively short intervention periods, and yoga is commonly applied in addition to standard pharmacotherapy, which limits the ability to assess its independent contribution to clinical outcomes.

Evidence regarding the use of yoga in patients with lung cancer and obstructive sleep apnea syndrome is more limited in quantity but suggests potential benefits. In oncological settings, yoga is associated with improved exercise tolerance, reduced anxiety, and better quality of life, particularly in perioperative and postoperative periods [29,30,31]. In obstructive sleep apnea syndrome, yoga based programs primarily improve respiratory muscle strength, sleep related outcomes, and cognitive performance, whereas effects on overall physical endurance appear less consistent [32].

The mechanistic explanations presented in the article are biologically plausible and supported by experimental and clinical data. Improvements in diaphragmatic function, increased chest wall mobility, shifts toward parasympathetic autonomic regulation, and reductions in dyspnea related anxiety are consistent with the reported clinical effects [3,11,15,16,18]. At the same time, most mechanistic data remain indirect, and direct links between physiological changes and long term clinical outcomes are insufficiently established.

LIMITATIONS

Several limitations of this review should be acknowledged. The narrative design implies the absence of a formalized search protocol, quantitative assessment of risk of bias, and evaluation of publication bias, which limits the reproducibility and methodological rigor of the conclusions. The included studies show substantial heterogeneity in design, sample size, intervention duration, and outcome measures [22,24,26,27]. In a number of studies, yoga intervention protocols are insufficiently described, further complicating comparison across trials.

An additional limitation is the scarcity of data on long term effects and the sustainability of observed benefits after completion of yoga based rehabilitation programs. In most studies, follow up periods are limited to several weeks or months, and information on patient adherence is fragmentary [23,25,32]. Moreover, the majority of available data concern patients with mild to moderate disease severity, which restricts extrapolation of findings to more severe clinical populations.

Overall, the available evidence allows yoga to be considered a potentially useful adjunctive intervention within

pulmonary rehabilitation programs for selected chronic respiratory diseases. At the same time, the identified methodological limitations and heterogeneity of the clinical evidence warrant cautious interpretation of the findings and underscore the need for further studies employing standardized intervention protocols, longer follow up periods, and clearly defined clinically relevant outcomes [24,26,27,32].

CONCLUSIONS

Current evidence indicates that yoga may serve as an adjunct to standard pulmonary rehabilitation. Across different respiratory diseases, including chronic obstructive pulmonary disease, asthma, lung cancer, and obstructive sleep apnea syndrome, yoga based interventions have been associated with improvements in lung function parameters, respiratory muscle performance, and selected measures of exercise tolerance. Reductions in symptom burden, particularly dyspnea and fatigue, as well as improvements in quality of life and psychological well being, have been reported in clinical studies.

The integration of yoga with established pulmonary rehabilitation approaches may provide additional benefits when applied as a complementary intervention alongside conventional therapy. Given the heterogeneity of disease severity, functional limitations, and intervention protocols, yoga based programs should be adapted to individual patient needs and implemented under appropriate professional supervision.

Despite encouraging findings, uncertainties remain regarding the optimal structure, duration, and specific components of yoga interventions for individual pulmonary conditions. Further clinical studies using standardized protocols and clearly defined outcome measures are needed to better delineate the role of yoga within pulmonary rehabilitation programs.

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AUTHORS' CONTRIBUTIONS:

Conceptualization: Anna Kaźmierska, Magdalena Boder, Krzysztof Blaut

resources: Anna Kaźmierska, Anna Chudyba

data curation: Anna Hamerla, Krzysztof Blaut

writing—original draft preparation: Anna Kaźmierska, Dariusz Jastrzębski

writing—review and editing: Dariusz Jastrzębski, Szymon Skoczyński

visualization: Anna Kaźmierska, Magdalena Boder

supervision: Anna Hamerla, Anna Chudyba

USE OF AI

AI tools were used to assist with language editing during manuscript preparation. The authors reviewed and approved all content.

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