Indonesian Journal of Global Health Research
Volume 8 Number 2, April 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

EFFICACY OF BREATHING TECHNIQUES AND POSITIONING STRATEGIES ON DYSPNEA AND NOCTURNAL SYMPTOMS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A SYSTEMATIC REVIEW

Ary Septri Mulainy[1]*, Agung Waluyo[2], Anggri Noorana Zahra[2]
[1]Master of Nursing, Medical-Surgical Nursing Specialization, Faculty of Nursing, Universitas Indonesia, Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Beji, Depok, Jawa Barat 16424, Indonesia
[2]Department of Medical-Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Beji, Depok, Jawa Barat 16424, Indonesia
*mulainy@gmail.com

ABSTRACT
Chronic Obstructive Pulmonary Disease (COPD) is a major global health burden and is projected by the World Health Organization (WHO) to become the third leading cause of mortality by 2030. This trend highlights the urgent need for multidisciplinary healthcare management to maintain patient stability and improve outcomes. Objective to evaluate the effectiveness of non-pharmacological breathing exercise techniques and patient positioning strategies in reducing dyspnea, enhancing lung function, improving nocturnal symptoms, and supporting overall quality of life in individuals with COPD. This systematic review followed PRISMA 2020 guidelines. Literature searches were conducted in PubMed, Scopus, ProQuest, EBSCO, SAGE Journals, ScienceDirect, and ClinicalKey using MeSH terms, keywords, and Boolean operators. The search strategy used combinations of the following main keywords: COPD, breathing exercise, breathing technique, positioning, pulmonary rehabilitation, dyspnea, nocturnal symptoms, sleep disturbances. Inclusion criteria were Randomized Controlled Trials (RCTs), adult participants (⩾19 years) and publication years 2020 – 2025. A total of 2,695 articles were identified. After screening, removal of duplicates, and full-text assessment, 14 studies met the inclusion criteria. Analysis of the 14 included studies demonstrated that a variety of non-pharmacological breathing techniques particularly when combined with optimal patient positioning, pulmonary rehabilitation, supportive devices, complementary therapies, and virtual-reality–based interventions consistently improved lung function, functional capacity, dyspnea, and health-related quality of life in patients with COPD. None of the included studies reported adverse effects related to the interventions. Breathing exercise techniques and therapeutic positioning are effective non-pharmacological strategies for managing COPD symptoms.

Keywords: breathing exercise; breathing technique; chronic obstructive, COPD; dyspnea; nocturnal symptoms; patient positioning; pulmonary disease; sleep wake disorders; standard of care

How to cite (in APA style)
Mulainy, A. S., Waluyo, A., & Zahra, A. N. (2025). Efficacy of Breathing Techniques anEfficacy of Breathing Techniques and Positioning Strategies on Dyspnea and Nocturnal Symptoms in Patients with Chronic Obstructive Pulmonary Disease: A Systematic Reviewd Positioning Strategies on Dyspnea and Nocturnal Symptoms in Patients with Chronic Obstructive Pulmonary Disease: A Systematic Review. Indonesian Journal of Global Health Research, 8(2), 217–226. https://doi.org/10.37287/ijghr.v8i2.951.

INTRODUCTION

Global health today is strongly influenced by various factors, including climate change, environmental conditions, social and economic determinants, and individual behaviors. One emerging trend is the increasing burden of respiratory disorders. According to the World Health Organization (2025), Chronic Obstructive Pulmonary Disease (COPD) has become a major global health concern, with its mortality ranking rising from the sixth leading cause of death in 2000 to the fourth worldwide, and it is projected to become the third leading cause of mortality by 2030. In Indonesia, WHO data (2024) recorded COPD-related mortality in 2021 at 47,921 per 100,000 men. and 31,491 per 100,000 females, indicating that COPD remains a serious national health problem. Several risk factors are associated with COPD, including tobacco smoke, environmental pollution (industrial emissions and household combustion), sex, family history, genetics, infectious disease history, and socioeconomic factors. According to the Global Initiative for Obstructive Lung Disease

(GOLD), COPD is a heterogeneous pulmonary condition characterized by chronic respiratory symptoms such as dyspnea, cough, sputum retention, and recurrent exacerbations arising from abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) caused by persistent airflow limitation. The clinical impact of COPD varies among individuals depending on disease severity. GOLD classifies COPD severity according to post-bronchodilator FEV1: GOLD I (Mild): FEV1 ≥ 80% predicted; GOLD II (Moderate): 50% ≤ FEV1 < 80% predicted; GOLD III (Severe): 30% ≤ FEV1 < 50% predicted; and GOLD IV (Very Severe): FEV1 < 30% predicted.

Additional symptoms that may influence management include anxiety, depression linked to symptom perception, and obstructive sleep apnea (OSA). Patients with moderate-to-severe COPD often experience characteristic nocturnal symptoms due to hypoxemia, such as poor sleep, excessive daytime sleepiness, sleep apnea, and snoring (GOLD, 2025; Ministry of Health of the Republic of Indonesia, 2019; WHO South-East Asia, 2025; Yuldasheva & Azkhodjaeva, 2022).

COPD is a chronic, progressive, and irreversible disease, requiring dynamic and continuous therapeutic management. In developing countries, including Indonesia, several challenges often arise during the implementation of COPD care. According to the GOLD (2025) guidelines, management includes establishing the diagnosis, initial assessment (including pharmacological and non-pharmacological interventions), followed by ongoing evaluation of treatment response and adjustment. The goals are to (1) reduce symptoms by improving exercise tolerance, symptom control, and quality of life, and (2) reduce risk by preventing exacerbations, slowing disease progression, and lowering mortality. These goals align with the Indonesian Ministry of Health Regulation No. HK.01.07/MENKES/687/2019, which includes patient education, smoking cessation, medications, pulmonary rehabilitation, chest physiotherapy, oxygen therapy, mechanical ventilation, and adequate nutrition (GOLD, 2025; Ministry of Health RI, 2019; Indonesian Society of Respirology, 2023).

Despite comprehensive clinical guidelines, COPD exacerbations and mortality rates continue to rise. Multidisciplinary healthcare professionals play a critical role in strengthening COPD management through targeted interventions aligned with their respective roles and functions. Several aspects of COPD care involve patient self-management and therefore require a therapeutic approach. Dyspnea, cough, and sputum retention are common symptoms that frequently lead to reduced physical activity capacity, along with recurrent symptoms occurring even during rest and sleep. Some patients cannot receive additional sleep-related therapies due to underlying hypoxemia, which poses significant risks. Non-pharmacological interventions such as pursed-lip breathing, deep breathing techniques, and positioning strategies to enhance comfort during symptoms or rest are frequently recommended as supportive measures (Rahmi et al., 2023; Tsiligianni & Kocks, 2020; WHO South-East Asia, 2025; Wu et al., 2023).

Based on this background, this systematic review aims to identify updated and innovative strategies to address dyspnea and nocturnal symptoms (symptoms occurring during rest/sleep) commonly experienced by patients with COPD, with a particular focus on breathing exercise techniques and body positioning strategies.

METHOD

The initial step involved searching for articles across several electronic databases, including PubMed, Scopus, ProQuest, EBSCO, SAGE, ScienceDirect, and ClinicalKey, using the PICO framework: Patient/Problem (P): Chronic Obstructive Pulmonary Disease (COPD); Intervention (I): Breathing techniques (including positioning strategies); Comparison (C): Standard of care; Outcome (O): Reduction of dyspnea and nocturnal symptoms as well as other observed clinical findings. The search was conducted using a combination of MeSH terms, keywords, and free-text terms, adjusted according to the characteristics of each database. The inclusion criteria were aligned

with the PICO components, with additional restrictions applied to studies involving adult patients aged ≥19 years, published between 2020 and 2025, written in English, available in full text, and designed as Randomized Controlled Trials (RCTs). The search strategy incorporated Boolean operators (AND, OR) to combine relevant keywords. All references retrieved during the search and selection process were imported and managed using Mendeley Desktop. Literature selection followed the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, involving identification, screening, eligibility assessment, and inclusion, as illustrated in the PRISMA flow diagram (Figure 1).

To ensure objectivity and minimize selection bias, article screening was performed independently by Author 1 and Author 2, particularly during the full-text eligibility assessment. Any disagreements were subsequently resolved through discussion with Author 3 to reach a final consensus. Data from the included studies were then extracted into a structured table. To ensure methodological quality, this systematic review employed the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for RCTs. The search process initially identified a total of 2,695 articles from the following databases: SAGE Journals (n = 274), ProQuest (n = 48), EBSCO (n = 442), Scopus (n = 128), ScienceDirect (n = 699), PubMed (n = 566), and ClinicalKey (n = 538). After removing duplicates and clearly irrelevant articles (n = 265), 2,430 articles remained for initial title and abstract screening. Of these, 1,743 articles were excluded, leaving 687 full-text articles assessed for retrieval. A total of 624 articles could not be retrieved, resulting in 63 articles eligible for full-text assessment. Forty-nine articles were further excluded due to incomplete article information (n = 5), duplication (n = 12), lack of relevance to the topic (n = 18), and failure to meet inclusion criteria (n = 14). Ultimately, 14 articles met all criteria and were included in the final analysis.

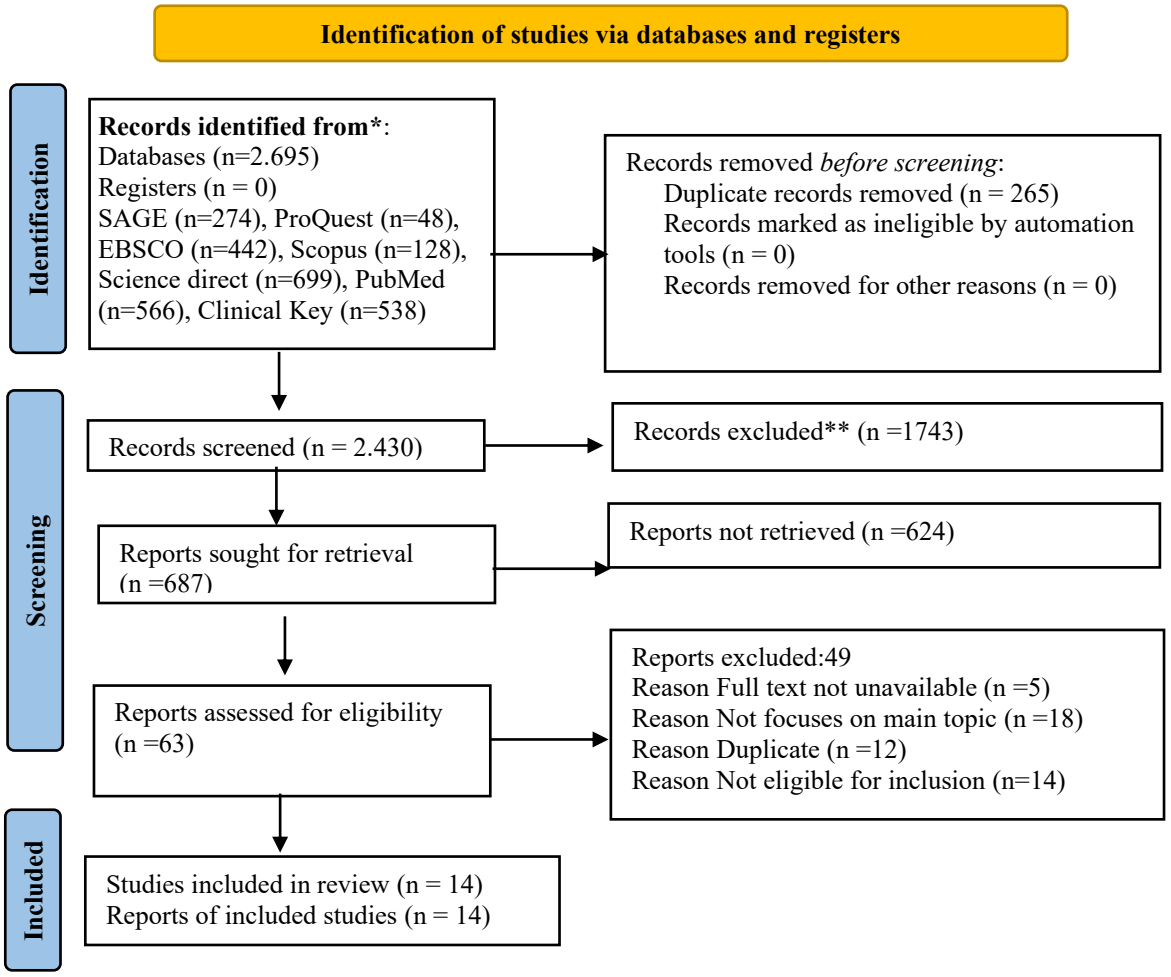

Figure 1 Flowchart of article search with PRISMA

RESULT

Table 1.
Identification of Articles with *Randomized Control Trial* (RCT) Research Design

ID Study	Sample	Average age (years)	Respondent characteristics
Özer et al. (2021) Türkiye	60	18-55	Inclusion criteria: Age 18-55 years, diagnosed with asthma, COPD (≥ 6 months), not illiterate, have an internet package, willing to participate in the zoom program. Exclusion criteria: COPD exacerbation, cognitive impairment, participating in the same program (≤ 6 months).
Ceyhan & Kartin (2022) Türkiye	67	60-69	Inclusion criteria: Age > 18 years, COPD diagnosis (≥ 3 months), never participated in a rehabilitation program, inhaler therapy: at least 2x/day & inappropriate use. Exclusion criteria : Mental disorders, difficulty communicating, unstable heart disease.
Neşe & Samancioğlu, (2022) Türkiye	116	45-85	Inclusion criteria : Age >18 years, good consciousness, COPD diagnosis (≥6 months), no cardiac, physical & mental communication disorders. Exclusion criteria : Diagnosed with hearing loss, unwilling to participate in regular training.
Cazorla et al. (2023) Belgium	37	63-75 (Mean 69±7)	COPD GOLD III or IV, acute pulmonary exacerbation recovery phase, planned pulmonary rehabilitation program.
Mohammed et al. (2023) Egypt	60	Group: DB, PLB: 60.4±5.3 and BMI: 63.3±7.8	Diagnosis of stable Occupational COPD GOLD II-III, never participated in a pulmonary rehabilitation program .
Mok et al. (2023) Singapore	18	Intervention group: 75.6 ±11, and control: 72.1 ±6.2	Age ≥ 21 years , COPD diagnosis with Post-bronchodilator FEV_1 /FVC < 0.7 who is hospitalized , activity tolerance, approved by DPJP Lung to be able to participate in the program.
Liu et al. (2023) China	120	56-71 (Mean 63.8±7.5)	Age 45-75 years, mild to moderate COPD with stable condition
Sevasta et al. (2023) Malta	108	Intervention group: 68.7±3.7 and control: 65.3±5.5	Age 40-79 years, stable COPD diagnosis without exacerbation (≤ 3 months).
Zare et al. (2024) Iran	32	Intervention group: 67.06 ±8.04 and control: 58.00±8.00	Groups B and E (GOLD Standard), approved by the DPJP Pulmonary, do not have mental disorders or exercise-inhibiting diseases, have not participated in pulmonary rehabilitation.
Zeng et al. (2024) China	55	Intervention group: 65.7 and control: 66.8	Age ≥ 40 years, able to complete *the walking test* , patients with AECOPD (*Acute exacerbation of COPD*) , hospitalized patients (≤ 24 hours) .
Shen et al. (2024) China	57	55.7-70.1 (Mean 62.9 ± 7.2)	Stable COPD without oxygen, SpO_2 ≥ 88% , exacerbation-free ≥ 4 weeks , no specific disorders such as hypercapnia .
Farooq et al. (2024) Pakistan	74	40-75	Age 40-75 years, COPD Grade II, III, IV (GOLD standard), Borg Dyspnea score ≤ 4.
Kizmaz et al. (2024) Türkiye	50	Pulmonary rehabilitation (PR) group: 64.24 ± 6.74 and *Virtual reality* (VR) and PR: 62.64 ± 6.76	Age 35-85 years, FEV_1 <70% & FEV_1 /FVC <70% , COPD Exacerbation stable (48 hours), *Hodkinson mental test score* >6.
Song F et al. (2025) China	63	66.8	Age 55-80 years, COPD GOLD I, stable

Table 2.
Results of research articles

ID Study	Objective	Research Articles
Özer et al. (2021) Türkiye	To assess the effect of yoga on dyspnea/shortness of breath, fatigue & sleep quality in patients with chronic	Measuring instrument : Dyspnea (*modified Medical Research Council/* mMRC); sleep quality (*Asthma and* COPD *sleep impact scale* /CASIS); fatigue (COPD *and asthma fatigue scale/* CAFS) Exercise technique : Yoga consists of breathing movements (*pranayama*), yoga postures (*asanas poses*) adjusted to patient tolerance and relaxation phase (meditation). Duration : 2x/week, 1 hour/session for 8 weeks. Comparison group : Standard care control group. Results : Yoga

ID Study	Objective	Research Articles
	diseases including COPD and asthma.	exercise has been shown to reduce shortness of breath, fatigue and improve sleep quality ($p<0.05$).
Ceyhan & Kartin (2022) Türkiye	*Pursed lip breathing/PLB* exercises and inhaler training on dyspnea and quality of life in COPD patients.	Measurement tools : Dyspnea (mMRC); quality of life (SGRQ/ (*St.George's respiratory questionnaire*); checklist of inhaler use and PLB practice; clinical status (COPD *assessment test/* CAT). Exercise technique : PLB: inhale slowly through the nose (2-3 seconds) and exhale slowly through pursed lips (4-6 seconds), Practice correct use of inhaler Duration : 4 weeks Comparison group : Group I (PLB and Inhaler practice), Group II (Inhaler practice) Results : The difference in intervention between groups was not significant. Groups I and II were equally effective in reducing shortness of breath, improving quality of life and accuracy in using inhalers ($p<0.05$).
Neşe & Samancioğlu (2022) Türkiye	Assessing the effect of *progressive muscle relaxation/PMR* and *deep breathing/DB* on shortness of breath and fatigue in COPD	Measuring instruments : Shortness of breath (*dyspnea-12 scale*); fatigue (CAFS). Exercise techniques : PMR: *PMR application manual* and audio, DB: deep breathing and relaxing for 20-25 minutes Duration : PMR: 1x daily, DB: 3x daily for 10 weeks Comparison groups : Intervention Group I (PMR), II (DB), Standard care control group Results : Intervention in both PMR and DB groups was proven to reduce shortness of breath and fatigue ($p<0.05$).
Cazorla et al. (2023) Belgium	Assessing group *breathing control exercises* on quality of life, functional capacity, muscle strength, shortness of breath, in severe COPD recovery phase from acute exacerbation.	Measurement tools : Quality of life (SGRQ); dyspnea (*Modified Borg scale*); clinical status (CAT); handgrip strength test (*Handgrip strength: dynamometer*); functional capacity test (*5-time sit-to-stand test/5STST*). Exercise technique : *Breathing control exercises* in groups (5-6 people) with inspiratory or expiratory exercises, occupational therapy all focuses on synchronization between body movement positions and patient breathing techniques. Duration : 3-4 sessions/week, each session 30 minutes (6-week program with 20 group sessions). Comparison group : Control group standard care rehabilitation program. Results : *Breathing control exercises* in groups better in improving quality of life, muscle strength, functional capacity, reducing shortness of breath in severe COPD patients who experienced remission due to exacerbation ($p<0.001$).
Mohammed et al (2023) Egypt	Assessing the effectiveness of inspiratory muscle training with BMI/ *threshold inspiratory muscle trainer* combined with PLB and DB in occupational COPD patients	Measurement tools : Shortness of breath (mMRC *, Modified Borg scale*); Exercise capacity (*Six-minute-walk test/6MWT*); Pulmonary function (spirometry). Exercise techniques : IMT with *POWERbreate* assesses all inspiratory muscles at a constant external load, DB and PLB exercises, each exercise with the body upright, relaxed and according to tolerance, Duration : 2 sessions per day with 30 breaths (4-5 minutes/session) performed 7 days/week (3 months). Comparison group : Control group of patients with DB and PLB exercises without equipment. Results : IMT exercise with *POWERbreathe* was proven to be better in increasing exercise capacity, lung function and reducing shortness of breath in occupational COPD patients ($p<0.05$).
Mok et al. (2023) Singapore	Assessing the role of high *flow nasal oxygen (HFO) therapy* in pulmonary rehabilitation (PR) in post-exacerbation COPD patients	Measurement tools : Exercise Capacity (*6 minute walk distance/6MWD*); clinical status (CAT); pulmonary function (spirometry); *mood (hospital anxiety and depression scale/HADS)* . Exercise technique : PR program: 30 minutes of aerobic exercise followed by 30 minutes of muscle training with HUR® machine, observation of shortness of breath and exercise tolerance. Duration : 2 training sessions/week, duration 60 minutes (6 weeks). Comparison group : standard care control group with room air/ordinary nasal cannula. Results : The 6MWD value increased compared to usual care by 30 m (95% CI: -23 m to 84 m). This was not statistically significant (n=18) but was still clinically significant. The administration of HFO during the pulmonary rehabilitation program was proven to be safe and increased exercise tolerance in post-exacerbation COPD patients.
Liu et al. (2023) China	To assess the effectiveness of Tai Chi complementary exercise (combined breathing and *mindfulness techniques*) for pulmonary rehabilitation (PR) in stable COPD patients.	Measurement tools : Quality of life (SGRQ); pulmonary function (spirometry); exercise capacity (6MWD); dyspnea score (mMRC), dyspnea on exercise (*Borg scale*); COPD clinical status (CAT); anxiety and depression (HADS); balance (*Berg balance scale/BBS*) and inflammatory cytokine examination. Exercise technique : Accompanied by a Physiotherapist, 1) Tai Chi (TC) group: focuses on body movement and breathing coordination, 2) TBRS (*Total body recumbent stepper*) group: sitting position (adjust to patient tolerance) using the *TBRS humaneotec tool,* 3) TBRS-TC combined group Duration : TC and TBRS groups, duration of 30 minutes per session, frequency 3x a week for 2 months of exercise in the hospital followed by 10 months at home/community (12 months) Comparison group : standard care control group Results : There were no reports of side effects, the TBRS-TC combined intervention was more effective than single

ID Study	Objective	Research Articles
		exercise or usual care in improving quality of life, exercise capacity, balance, anxiety and depression and reducing inflammatory cytokine results (p <0.001).
Sevasta et al. (2023) Malta	*of the muscle energy techniques (METs)* program on lung function, chest mobility, functional capacity and ADL in COPD patients.	Measurement tools : Pulmonary function (spirometry); chest wall mobility (measuring tape); ADLs (*Manchester Respiratory activities of daily living/MR-ADL*); functional capacity (6MWT). Exercise technique : METs following the Chaitow protocol: doing muscle stretching-isometric contraction for 7 seconds-muscle relaxation for 3 seconds- do passive stretching for 30 seconds. Duration : Each session is 30 minutes, 3 times per week for 4 weeks Comparison group : Standard care control group. Results : METs can be used as an additional non-pharmacological therapy to help manage shortness of breath; increase chest mobility (p<0.001); improve lung function (p<0.001); improve ADL (p<0.001); functional capacity (6MWT p=0.08) is not statistically significant but shows clinical improvement. So the METs Intervention group is proven to be more effective.
Zare et al. (2024) Iran	Comparing the effects of single & combined breathing exercises with *breathing stretching* on clinical status, respiratory index, exercise capacity of COPD patients	Measuring instruments : Oxygen saturation (*pulse oximeter*); PCO_2 (*Venous blood gas/VBG*); COPD clinical status (CAT); Exercise Capacity (6MWT). Exercise technique : control group with routine breathing exercises: DB and PLB, Intervention group: combination of DB, PLB and *breathing-stretching* (muscle stretching for 5 days from bed position to active position exercise by standing/walking) Duration : twice a day (at 10:00 am and 6:00 pm) for 5 days Comparison group : Control group and intervention group Results : Both groups showed effectiveness of the intervention but in the combined intervention the score was more significant in respiratory function ($PCO_2 \downarrow$ and O_2 saturation ↑), clinical status (CAT score ↓), Exercise capacity (6MWT ↑), (p <0.05).
Zeng et al. (2024) China	To assess the effectiveness and safety of pulmonary rehabilitation (PR) interventions carried out early (first 48 hours) in AECOPD (*Acute exacerbation of chronic obstructive pulmonary disease) patients.*	Measuring instruments : Exercise capacity (6MWT); quality of life (CAT), shortness of breath (mMRC); pulmonary function (sprimeter); inspiratory muscle strength (*threshold inspiratory muscle trainer/POWERbreathe*) and documentation of side effects of the intervention. Exercise technique : Education and strength training *of* the upper body with *dumbbells* , lower body while lying down with *a sandbag* , Inspiratory muscle training *is* done by breathing sessions with a tool, sitting upright, Endurance *exercise training* : Walking exercise Duration : 48 hours after hospitalization for 7-10 days with details of inspiratory exercise (30 breaths per day), Strength training (± 3 sets), endurance exercise (10-15 minutes per session in 5 days per week) then the patient is followed for 1 year, Comparison group : standard care control group without structured physical exercise Results : PR intervention from early (first 48 hours) is considered safe, there are no reports of side effects, the combination of exercises given is proven to be able to strengthen the inspiratory muscles (PI_{max}) (p = 0.006) and walking ability (p = 0.04) compared to the control group in AEOCPD patients, but the variables of shortness of breath (p = 0.21) and quality of life (p = 0.09) did not show significant differences between the two groups.
Shen et al. (2024) China	Assessing the efficacy of a pulmonary rehabilitation (PR) program in COPD-Obstructive Sleep Apnoea overlap syndrome patients using *positive airway pressure (PAP)*	Measurement tools : Physical endurance *with* 6MWT; Shortness of breath (mMRC); activity ability (Barthel Index/BI); Lung function (spirometry); *Body mass index (BMI); Nocturnal hypoxia (Polysomnography/PSG).* Exercise technique : moderate intensity aerobic exercise in sitting position Duration : 40 minutes per session, 5 times a week (20 weeks) Comparison group : PAP therapy control group without PR exercise. Results : no reports of side effects were found, the combination of pulmonary rehabilitation (PR) exercise and aerobic exercise showed a significant increase in 6MWD distance measurements, Barthel index scores, body mass index (BMI), decreased fat mass *(* p<0.01) in addition to improved sleep quality at night (p=0.008).
Farooq et al. (2024) Pakistan	Evaluating EMST-150 (*Expiratory Muscle Strength Training*) on lung function, maximum expiratory pressure (MEP), shortness of breath, quality of life in COPD patients	Measuring instruments : Lung function (spirometer); Shortness of breath (*Borg scale*); quality of life (SGRQ); expiratory muscle pressure (MEP). Exercise techniques : Intervention group with EMST-150 device: involving mild resistive expiratory technique of patient in sitting position exhaling strongly for 5 seconds into the device, Control group with 1) PLB exercise technique in chair, upright position done 4-5 times a day, 2) DB technique by lying down, knees bent, head supported done 3-4 times a day for 10 minutes and 3) incentive spirometer with standing position done every hour at least ±10 times Duration : 5 days per week for 6 weeks. Comparison group : control group with breathing exercises. Results : the combination of breathing exercises and EMST-150 device in the intervention group was proven to be better in improving respiratory parameters: lung function

ID Study	Objective	Research Articles
		in FEV1 , FVC, and MEP. For SQRQ↓ scores in both control and intervention groups, it means it has a good effect on quality of life (p <0.001).
Kizmaz et al. (2024) Türkiye	Assessing the effects of *Virtual reality (VR)* on symptoms, ADL, functional capacity, anxiety & depression levels in COPD exacerbation	Measuring tools : Functional status (*Sit-to-stand-test/STST*); shortness of breath (mMRC); COPD clinical status (CAT); Anxiety & depression (HADs), ADL (*London activities of daily living/LCADL*). Exercise techniques : *Respiratory control , DB , Thoracic expansion exercises , PLB , Dyspnea reduction positions , Relaxation exercises , Cough and huffing training , Upper extremity exercises combined with breathing, and walking exercises.* Duration : Treatment is carried out once a day until the patient is discharged Comparison group : Control group: traditional pulmonary rehabilitation (PR), VR and PR intervention groups Results : The combination of VR exercises with PR is safe to do and the results obtained are higher than PR (p <0.001).
Song F et al. (2025) China	To assess the effects of *abdominal breathing training* with *head-down strong abdominal breathing training/HDBT* on cognitive function and walking performance in stable COPD patients.	Measurement tools : Cognitive function (*Montreal Cognitive Assessment/* MoCA); Walking performance (frequency, length, speed of steps). Training techniques : 1) HDT (*Head-Down Training*): angle of inclination 0^0 -30^0 without strong abdominal breathing 2) BT (*Strong abdominal breathing training*): do strong abdominal breathing 3) HDBT (*Head-down strong abdominal breathing training*) with the body position tilted downwards, angle of inclination 0^0 -30^0 with a *handstand trainer* , then do *strong abdominal breathing* Duration : 3x/week, each session 1 hour for 12 weeks Comparison group : BT, HDT and HDBT groups Results : HDBT training was shown to improve cognitive function higher than HDT (p=0.048), BT (p=0.028) and walking performance, especially in stride length (p<0.001) and stride speed (p=0.018) in stable COPD patients

Table 3.
JBI *critical appraisal*

ID Study	JBI Checklist Items													Overall appraisal
	Q_1	Q_2	Q_3	Q_4	Q_5	Q_6	Q_7	Q_8	Q_9	Q_{10}	Q_{11}	Q_{12}	Q_{13}	
Özer et al. , 2021	Yes	UC	Yes	UC	NO	UC	Yes	Yes	UC	Yes	Yes	Yes	Yes	Included
Ceyhan & Kartin , 2022	Yes	No	Yes	No	No	UC	Yes	Yes	No	Yes	Yes	Yes	Yes	Included
Neşe & Samancioğlu, 2022	Yes	UC	Yes	UC	UC	UC	Yes	UC	UC	Yes	Yes	Yes	Yes	Included
Cazorla et al. , 2023	Yes	Yes	Yes	Yes	UC	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included
Mohammed et al. , 2023	Yes	Yes	No	UC	No	Yes	Yes	No	No	Yes	UC	Yes	Yes	Included
Mok et al. , 2023	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	UC	Yes	Included
Liu et al. , 2023	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	UC	Yes	Yes	Included
Sevasta et al. , 2023	Yes	Yes	UC	Yes	No	No	Yes	UC	UC	Yes	Yes	Yes	Yes	Included
Zare et al. , 2024	UC	UC	No	No	No	Yes	Yes	Yes	UC	Yes	Yes	Yes	Yes	Included
Zeng et al. , 2024	Yes	No	Yes	UC	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Included
Shen et al. , 2024	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	UC	Yes	Yes	Included
Farooq et al. , 2024	Yes	UC	Yes	No	No	UC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Included
Kizmaz et al. , 2024	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	UC	Yes	Yes	Included
Song F et al. , 2025	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	UC	Yes	Yes	Included

Note: : * *JBI Critical Appraisal Checklist for RCTs* consists of 13 question items Q_1 –Q_{13} , namely *randomization* (Q_1), *allocation concealment* (Q_2) , *baseline similarity* (Q_3), *participant blinding* (Q_4), *deliverer blinding* (Q_5), *assessor blinding* (Q_6), *identical treatment* (Q_7), *complete follow-up* (Q_8), *intention-to-treat analysis* (Q_9), *same outcome measurement* (Q_{10}), *reliable measurement* (Q_{11}), *appropriate statistical analysis* (Q_{12} , *appropriate trial design* (Q_{13}), Items : Yes, No., *Unclear* (UC), *Not Applicable* (NA).

A systematic review of 14 studies consisting of a total of 917 participants, with a mean age of approximately 65.1 years, found that most respondents were diagnosed with moderate-to-severe COPD in stable condition or in the recovery phase following an acute exacerbation. The majority of studies were conducted in China and Turkey. Study durations varied widely, ranging from 5 days to 12 months, with most interventions delivered in 30–60 minute sessions according to patient tolerance. A variety of outcome measurement tools were used, including dyspnea scales (mMRC), exercise capacity (6MWT), COPD clinical status (CAT), pulmonary function tests (spirometry),

anxiety and depression scales (HADS), nocturnal symptoms and sleep quality assessments (CASIS or polysomnography), and quality of life measures (SGRQ).

DISCUSSION

Analysis of the 14 included studies demonstrates a significant improvement in health status among COPD patients following breathing technique interventions. Nearly all non-pharmacological interventions applied to COPD patients yielded positive outcomes, reinforcing that non-pharmacological measures are not merely optional but are integral components of COPD management. The most frequently applied breathing techniques were pursed-lip breathing (PLB), deep breathing (DB), progressive muscle relaxation (PMR), and inspiratory/expiratory muscle training (IMT/EMT). The popularity of these methods aligns with the characteristics of the study population, in which most COPD patients were stable or in the post-exacerbation recovery phase (10 of 14 studies).

Clinically, these techniques are appropriate because they are easy to understand, safe, and provide substantial benefits. COPD management is long-term and requires consistent patient adherence; hence, interventions that are simple and safe are highly advantageous. No studies reported adverse effects, supporting the safety of these interventions. From a physiological perspective, PLB and DB effectively reduce exertional dyspnea, fatigue, and air trapping. PMR offers comfort and relaxation, helping manage muscle tension, anxiety, and sleep disturbances. IMT and EMT enhance respiratory muscle strength and endurance. Collectively, these techniques positively influence daily functioning, activity of daily living (ADL), exercise capacity, and quality of life.

Several studies combined basic breathing exercises with devices such as POWERbreathe for IMT and the EMST-150 for EMT, resulting in superior improvements in exercise capacity, lung function (FEV1, FVC, MEP), and dyspnea reduction compared with standard exercises. Zeng et al. (2024) reported that early initiation of pulmonary rehabilitation within the first 48 hours of hospitalization was more effective and safe. Mok et al. (2023) demonstrated the benefits of high-flow oxygen (HFO) in improving exercise tolerance during post-exacerbation pulmonary rehabilitation.

Notably, some researchers applied complementary approaches incorporating yoga and Tai Chi with mindfulness-centered breathing techniques. These combined methods significantly improved respiratory and psychological outcomes, reduced fatigue and anxiety, enhanced lung capacity, and improved nocturnal symptoms and sleep quality (Ceyhan & Tekinsoy Kartin, 2022; Farooq et al., 2024; Liu et al., 2023; Mohammed et al., 2023; Mok et al., 2023; Neşe & Samancioğlu Bağlama, 2022; Özer et al., 2021; Sevasta et al., 2024;

According to Armstrong et al. (2025), appropriate body positioning helps maintain optimal physiological function and enables better access to anatomical areas during clinical procedures. When selecting patient positions, factors such as age, body composition, and underlying respiratory or circulatory disorders must be considered. Several studies incorporated strategic body positioning combined with pulmonary rehabilitation, producing significant benefits by optimizing respiratory mechanics and enhancing ventilatory efficiency. Positions identified in the included studies included Fowler's, upright sitting, semi-Fowler's, tripod position, and head-down strong abdominal breathing training (HDBT). These combined approaches improved respiratory muscle function, cognitive performance, and walking capacity in stable COPD patients.

Cazorla et al. (2023) found that group-based training sessions led to higher attendance and improved intervention success. Shen et al. (2024) demonstrated that combining moderate-intensity aerobic exercise with pulmonary rehabilitation in a seated position improved pulmonary function and nocturnal hypoxia in patients with COPD–obstructive sleep apnea overlap syndrome using positive airway pressure (PAP). Meanwhile, Kizmaz et al. (2024) introduced an innovative

approach integrating virtual reality (VR) with pulmonary rehabilitation including respiratory control, DB, thoracic expansion, PLB, dyspnea-relief positioning, relaxation exercises, cough/huff techniques, upper-extremity exercises with breathing, and walking yielding more substantial improvements (Cazorla et al., 2023; Kizmaz et al., 2024; Shen et al., 2021; Song et al., 2025; Zare et al., 2025).

CONCLUSION

Breathing techniques including strategic positioning are effective and safe non-pharmacological interventions for COPD management. Methods such as PLB, DB, IMT, yoga, Tai Chi, and combined breathing-based pulmonary rehabilitation programs including those incorporating modern devices have been shown to enhance exercise capacity, reduce dyspnea, improve lung function, and elevate overall quality of life, including psychological well-being and nocturnal symptoms. Combined interventions, in particular, are recommended as integral components of non-pharmacological pulmonary rehabilitation programs, as they demonstrate superior benefits compared with single-technique interventions.

REFERENCES

Cazorla, S., Busegnies, Y., D'Ans, P., Héritier, M., & Poncin, W. (2023). Breathing Control Exercises Delivered in a Group Setting for Patients with Chronic Obstructive Pulmonary Disease: A Randomized Controlled Trial. *Healthcare (Switzerland)* , *11* (6). https://doi.org/10.3390/healthcare11060877

Ceyhan, Y., & Tekinsoy Kartin, P. (2022). The effects of breathing exercises and inhaler training in patients with COPD on the severity of dyspnea and life quality: a randomized controlled trial. *Trials* , *23* (1). https://doi.org/10.1186/s13063-022-06603-3

Farooq, V., Tariq, M.I., Fawad, M., Malik, S., Nadeem, S., & Sheraz, S. (2024). Effects of resistive expiratory muscle training on lung function in patients with chronic obstructive pulmonary disease: a randomized controlled trial. *Khyber Medical University Journal* , *16* (2), 110–116. https://doi.org/10.35845/kmuj.2024.23027

GOLD. (2025). *Pocket-Guide-2025-v1.2-FINAL-covered-13Dec2024_WMV* . 1–42. www.goldcopd.org

Ministry of Health of the Republic of Indonesia. (2019). *Ministry of Health of the Republic of Indonesia No. HK.01.07/MENKES/687/2019 concerning National Guidelines for Medical Services for the Management of COPD* .

Kizmaz, E., Telli Atalay, O., Çetin, N., & Uğurlu, E. (2024). Virtual reality for COPD exacerbation: A randomized controlled trial. *Respiratory Medicine* , *230* . https://doi.org/10.1016/j.rmed.2024.107696

Liu, W., Liu, X.M., Huang, Y.L., Yu, P.M., Zhang, Tai Chi as a complementary exercise for pulmonary rehabilitation in chronic obstructive pulmonary disease: A randomized controlled trial. *Complementary Therapies in Medicine* , *78* . https://doi.org/10.1016/j.ctim.2023.102977

Mohammed, M., Hassan, S., Aziz, A.A., Mohamed, M.F., & El Nahas, N. (2023). Efficacy of threshold inspiratory muscle trainer versus diaphragmatic plus pursed lip breathing in occupational COPD. *Beni-Suef University Journal of Basic and Applied Sciences* , *12* (1). https://doi.org/10.1186/s43088-023-00409-1

Mok, Y., Foong, JW, Wong, HS, Soh, A., Tan, SH, Tan, PC, Choo, BP, & Wong, KKH (2023). High flow nasal oxygen versus usual care in improving pulmonary rehabilitation outcomes of chronic obstructive pulmonary disease patients after an exacerbation - a pilot randomized controlled trial. *Proceedings of Singapore Healthcare* , *32* . https://doi.org/10.1177/20101058231204705

Neşe, A., & Samancioğlu Bağlama, S. (2022). The Effect of Progressive Muscle Relaxation and Deep Breathing Exercises on Dyspnea and Fatigue Symptoms of COPD Patients: A Randomized Controlled Study. *Holistic Nursing Practice* , *36* (4), E18–E26. https://doi.org/10.1097/HNP.0000000000000531

Özer, Z., Bahçecioğlu Turan, G., & Aksoy, M. (2021). The effects of yoga on dyspnea, sleep and fatigue in chronic respiratory diseases. *Complementary Therapies in Clinical Practice* , *43* . https://doi.org/10.1016/j.ctcp.2021.101306

PDPI (Indonesian Lung Doctors Association). (2023). *COPD: Guidelines for Diagnosis & Management in Indonesia* .

Rahmi, R., Irawati, D., & Waluyo, A. (2023). Breathing Techniques for Dyspnea in COPD Patients. *Journal of Telenursing (JOTING)* , *5* (1), 708–719. https://doi.org/10.31539/joting.v5i1.5501

Sevasta, K., Agius, T. P., & Sciriha, A. (2024). Muscle Energy Techniques in patients with COPD: a randomized controlled trial. *European Journal of Physiotherapy* , *26* (2), 78–86. https://doi.org/10.1080/21679169.2023.2192766

Shen, MD, Guo, LR, Li, YW, Gao, RT, Sui, X., Du, Z., Xu, LQ, Shi, HY, Ni, YY, Zhang, Role of the active cycle of breathing technique combined with phonophoresis for the treatment of patients with chronic obstructive pulmonary disease (COPD): study protocol for a preliminary randomized controlled trial. *Trials* , *22* (1). https://doi.org/10.1186/s13063-021-05184-x

Song, F., Ding, K., Sun, W., Huang, Q., Jiang, R., Xiang, H., & Sun, M. (2025). Effects of 12 weeks of Head-Down Strong Abdominal Breathing Training on Gait and Cognitive Function in Patients with Chronic Obstructive Pulmonary Disease. *International Journal of COPD* , *20* , 1347–1359. https://doi.org/10.2147/COPD.S514766

Tsiligianni, I., & Kocks, J. W. H. (2020). Daytime symptoms of chronic obstructive pulmonary disease: a systematic review. In *npj Primary Care Respiratory Medicine* (Vol. 30, Issue 1). Nature Research. https://doi.org/10.1038/s41533-020-0163-5

WHO South-East Asia. (2025). *Development of health education in South-East Asia* . World Health Organization, Regional Office for South-East Asia.

Wu, J., Meng, W., Zeng, H., Ma, Y., & Chen, Y. (2023). Relationship between nighttime symptoms and clinical features in COPD patients: A cross-sectional multicenter study in China. *Heart and Lung* , *62* , 168–174. https://doi.org/10.1016/j.hrtlng.2023.07.008

Yuldasheva, G. , & Azkhodjaeva, R. (2022). *View of Modern Trends in the Development of Healthcare* . https://doi.org/DOI:10.31557/APJEC.2022.5.S1.57

Zare, F., Karimyar Jahromi, M., Rahmanian, Z., &phaseleh Jahromi, M. (2025). Comparing effects of breathing exercises alone and combined with breathing-stretching exercises on respiratory indices, disease severity and exercise capacity in COPD. *Scientific Reports*, *15* (1). https://doi.org/10.1038/s41598-025-89664-z

Zeng, Y., Wu, Q., Chen, Y., & Cai, S. (2024). Early Comprehensive Pulmonary Rehabilitation For Hospitalized Patients With Acute Exacerbation Of Chronic Obstructive Pulmonary Disease: A Randomized Controlled Trial. *Journal of Rehabilitation Medicine, 56*. https://doi.org/10.2340/jrm.v56.39953