INPLASY

Network Meta-Analysis of the Effects of Intelligent Breathing Trainers versus Traditional Breathing Training on Pulmonary Function and Exercise Tolerance in Patients with Chronic Obstructive Pulmonary Disease

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data extraction.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 6 December 2025 and was last updated on 6 December 2025.

INTRODUCTION

Review question / Objective To conduct a network meta-analysis of the effects of intelligent breathing trainers and traditional breathing training on pulmonary function (FVC, FEV1, FEV1/FVC, IC/TLC) and exercise tolerance (6MWD) in patients with chronic obstructive pulmonary disease (COPD), and to clarify the efficacy ranking of different intervention measures.All authors declare no conflicts of interest related to this study.

Condition being studied Chronic Obstructive Pulmonary Disease (COPD) is a chronic respiratory disease characterized by persistent airflow limitation and respiratory symptoms (e.g., dyspnea, cough, sputum production). It severely impairs patients' pulmonary function and exercise tolerance, affecting quality of life.

METHODS

Search strategy Electronic databases: PubMed, Embase, Cochrane Library, Web of Science, China National Knowledge Infrastructure (CNKI), Wanfang Data, VIP Database.
Search terms: ("chronic obstructive pulmonary disease" OR "COPD") AND ("intelligent breathing trainer" OR "smart breathing exercise device") AND ("traditional breathing training" OR "conventional breathing exercise") AND ("network meta-analysis" OR "systematic review").

Participant or population Adult patients (aged ≥18 years) diagnosed with COPD (based on GOLD guidelines), regardless of disease severity (mild to very severe), with no severe comorbidities (e.g., severe heart failure, malignant tumors) that affect the study results.

Intervention Intelligent breathing trainers (including devices with real-time data monitoring, feedback functions, or personalized training programs) and traditional breathing training (e.g., pursed-lip breathing, diaphragmatic breathing, chest expansion exercises).

Comparator Comparison between intelligent breathing trainers and traditional breathing training; also includes comparisons of different types of intelligent breathing trainers (if applicable) and different forms of traditional breathing training.

Study designs to be included Randomized controlled trials (RCTs) only.

Eligibility criteria – **Inclusion criteria**: RCTs on adult COPD patients (≥18 years) comparing intelligent breathing trainers vs. traditional breathing training; studies reporting pulmonary function (FVC, FEV1, etc.) or 6MWD.
– **Exclusion criteria**: Non-RCTs, studies with incomplete data, duplicate publications, or participants with severe comorbidities.

Information sources Electronic databases (PubMed, Embase, Cochrane Library, CNKI, Wanfang, VIP); reference lists of included studies; contact with authors for missing data (if needed).

Main outcome(s) Primary outcomes: Pulmonary function (FVC, FEV1, FEV1/FVC, IC/TLC) and 6-minute walk distance (6MWD).

Additional outcome(s) Secondary outcomes: Quality of life (e.g., St. George's Respiratory Questionnaire scores) and adverse events (if reported).

Data management Two independent reviewers will extract data (e.g., study characteristics, intervention details, outcomes) using a pre-designed data extraction form. Discrepancies will be resolved by discussion or consultation with a third reviewer. Missing data will be requested from the original authors.

Quality assessment / Risk of bias analysis The quality of included RCTs will be assessed using the AHRQ (Agency for Healthcare Research and Quality) scale, evaluating aspects of study selection, comparability, and outcome measurement. A total score of >8 points will be considered high-quality studies.

Strategy of data synthesis RevMan 5.3 software will be used for data synthesis. Heterogeneity will be assessed using Q test and I^2 statistic; fixed-effects model will be used for $P>0.1$ and $I^2<50\%$, otherwise random-effects model. Network meta-analysis will be conducted to compare direct and indirect effects of interventions.

Subgroup analysis Subgroup analyses will be performed based on disease severity (mild/moderate/severe) and duration of intervention (≤4 weeks, 4-8 weeks, >8 weeks) to explore potential sources of heterogeneity.

Sensitivity analysis Sensitivity analysis will be performed by excluding low-quality studies (AHRQ score ≤8) and studies with missing data, then re-analyzing to verify the stability of the results.

Language restriction No language restrictions; studies in English and Chinese will be included.

Country(ies) involved China - Department of Respiratory and Critical Care Medicine, Meishan People's Hospital, Sichuan Province, China.

Other relevant information No additional relevant information to report.

Keywords Chronic Obstructive Pulmonary Disease, COPD, intelligent breathing trainer, traditional breathing training, network meta-analysis, pulmonary function, exercise tolerance.

Dissemination plans The results will be published in a peer-reviewed medical journal and presented at relevant academic conferences (e.g., respiratory medicine or rehabilitation medicine conferences).

Contributions of each author

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