INPLASY

The impact of respiratory muscle training on the duration and severity of respiratory symptoms in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis

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Corresponding author:
Li Zhang

15807100747@163.com

Author Affiliation:
The Central Hospital of Wuhan, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430014, China.

Yu, ZH; Huang, H; Fang, S; Zhang, L.

ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Completed but not published.

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 27 June 2025 and was last updated on 27 June 2025.

INTRODUCTION

Review question / Objective To systematically evaluate the impacts of respiratory muscle training (RMT) on the duration and severity of respiratory symptoms in individuals with chronic obstructive pulmonary disease (COPD).

Condition being studied Studies were selected if they satisfied the requirements listed below: (1) Study design: RCTs; (2) Participants: Patients diagnosed with COPD. (3) Outcomes: Studies reporting post-intervention outcomes such as pulmonary function indicators, including Forced Vital Capacity (FVC), Forced Expiratory Volume in the first second (FEV_1), and FEV_1/FVC ratio, as well as other clinical assessments including 6-Minute Walk Distance (6MWD), St. George's Respiratory Questionnaire (SGRQ) score [10], COPD assessment Test (CAT) score , and the Modified Medical Research Council (mMRC) Dyspnea Scale score.

METHODS

Participant or population Participants: Patients diagnosed with COPD.

Intervention Early pulmonary rehabilitation training mainly includes lip retraction training, deep breathing training, peripheral muscle strength training, sitting breathing training and multi-directional breathing training or Conventional nursing mode.

Comparator Early pulmonary rehabilitation training mainly includes lip retraction training, deep breathing training, peripheral muscle strength training, sitting breathing training and multi-directional breathing training.
Drug treatment combined with lip retraction and abdominal breathing training.
Respiratory muscle function exercise combined with deep breathing gymnastics mode.
Diaphragm breathing method, lip-closed breathing method and lung expansion exercises.

Conventional Western medicine basic treatment combined with breathing.
Muscle function training.
Inspiratory muscle exercise.

Study designs to be included Study design: RCTs.

Eligibility criteria A thorough literature search was carried out using a number of important Chinese databases, including the China National Knowledge Infrastructure (CNKI), the Chinese Biomedical Literature Database (CBM), the VIP Full-Text Database, the Wanfang Database, and electronic databases such as EMBASE, PubMed, ScienceDirect, and the Cochrane Library. In addition, manual reference tracking was employed to identify relevant studies not captured through database searches. The search aimed to determine randomized controlled trials (RCTs) evaluating the impacts of RMT on the duration and severity of respiratory symptoms in individuals with COPD. A combination of free-text terms and controlled vocabulary (subject headings) was used to ensure a comprehensive search strategy.

Information sources A thorough literature search was carried out using a number of important Chinese databases, including the China National Knowledge Infrastructure (CNKI), the Chinese Biomedical Literature Database (CBM), the VIP Full-Text Database, the Wanfang Database, and electronic databases such as EMBASE, PubMed, ScienceDirect, and the Cochrane Library. In addition, manual reference tracking was employed to identify relevant studies not captured through database searches. The search aimed to determine randomized controlled trials (RCTs) evaluating the impacts of RMT on the duration and severity of respiratory symptoms in individuals with COPD. A combination of free-text terms and controlled vocabulary (subject headings) was used to ensure a comprehensive search strategy. Keywords included: "respiratory symptoms," "inspiratory muscle training," "breathing exercises," "respiratory symptoms," "chronic obstructive pulmonary disease," and "severity." Only research released between January 2010 and the present were included in the search periodData items collected included the following: (1) Basic study information: first author, year of publication, and sample size; (2) Intervention details: The study group received RMT, while the control group (CG) received standard care, conventional pharmacotherapy, or pseudo-respiratory muscle exercises; (3) Outcome indicators: Post-intervention pulmonary function parameters including FEV_1, FVC, and FEV_1/FVC ratio; exercise tolerance measured by the 6MWD; health-related quality of life evaluated using the SGRQ; symptom severity assessed by the CAT; and dyspnea severity assessed using the mMRC Dyspnea Scale.

Main outcome(s) Data items collected included the following: (1) Basic study information: first author, year of publication, and sample size; (2) Intervention details: The study group received RMT, while the control group (CG) received standard care, conventional pharmacotherapy, or pseudo-respiratory muscle exercises; (3) Outcome indicators: Post-intervention pulmonary function parameters including FEV_1, FVC, and FEV_1/FVC ratio; exercise tolerance measured by the 6MWD; health-related quality of life evaluated using the SGRQ; symptom severity assessed by the CAT; and dyspnea severity assessed using the mMRC Dyspnea Scale.

Quality assessment / Risk of bias analysis Meta-analyses were conducted using RevMan (v5.3), a software provided by the Cochrane Collaboration. Using 95% CIs, odds ratios (ORs) were employed as effect measures for dichotomous outcomes. Weighted mean differences (WMDs) with associated 95% CIs were computed for continuous outcomes, such as pulmonary function measures (FEV_1, FVC, FEV_1/FVC), 6MWD, SGRQ score, CAT score, and mMRC dyspnea score. To assess heterogeneity (HET) among the selected studies, the I^2 value and Chi-squared test were employed. A fixed-effect model was employed to synthesize the data, and HET was considered modest if $P > 0.05$ and $I2 < 50\%$. A random-effects model (REM) was employed if P 50%, suggesting considerable HET, as long as a pooled analysis was judged suitable. A descriptive analysis was reported in place of meta-analysis when $P < 0.05$ and the source of HET couldn't be determined. Egger's regression asymmetry test and funnel plots were to be used to evaluate publication bias. The Trim and Fill technique would be used to account for any publication bias and modify the effect size if Egger's test produced a P value less than 0.1. However, in compliance with current methodological guidelines, funnel plot analysis was not performed because this meta-analysis had fewer than 10 trials.

Strategy of data synthesis Meta-analyses were conducted using RevMan (v5.3), a software provided by the Cochrane Collaboration. Using 95% CIs, odds ratios (ORs) were employed as effect measures for dichotomous outcomes. Weighted mean differences (WMDs) with associated 95% CIs were computed for

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Subgroup analysis Meta-analyses were conducted using RevMan (v5.3), a software provided by the Cochrane Collaboration. Using 95% CIs, odds ratios (ORs) were employed as effect measures for dichotomous outcomes. Weighted mean differences (WMDs) with associated 95% CIs were computed for continuous outcomes, such as pulmonary function measures (FEV_1, FVC, FEV_1/FVC), 6MWD, SGRQ score, CAT score, and mMRC dyspnea score. To assess heterogeneity (HET) among the selected studies, the I^2 value and Chi-squared test were employed. A fixed-effect model was employed to synthesize the data, and HET was considered modest if $P > 0.05$ and $I2 < 50\%$. A random-effects model (REM) was employed if P 50%, suggesting considerable HET, as long as a pooled analysis was judged suitable. A descriptive analysis was reported in place of meta-analysis when $P < 0.05$ and the source of HET couldn't be determined. Egger's regression asymmetry test and funnel plots were to be used to evaluate publication bias. The Trim and Fill technique would be used to account for any publication bias and modify the effect size if Egger's test produced a P value less than 0.1. However, in compliance with current methodological guidelines, funnel plot analysis was not performed because this meta-analysis had fewer than 10 trials.

Sensitivity analysis Meta-analyses were conducted using RevMan (v5.3), a software provided by the Cochrane Collaboration. Using 95% CIs, odds ratios (ORs) were employed as effect measures for dichotomous outcomes. Weighted mean differences (WMDs) with associated 95% CIs were computed for continuous outcomes, such as pulmonary function measures (FEV_1, FVC, FEV_1/FVC), 6MWD, SGRQ score, CAT score, and mMRC dyspnea score. To assess heterogeneity (HET) among the selected studies, the I^2 value and Chi-squared test were employed. A fixed-effect model was employed to synthesize the data, and HET was considered modest if $P > 0.05$ and $I2 < 50\%$. A random-effects model (REM) was employed if P 50%, suggesting considerable HET, as long as a pooled analysis was judged suitable. A descriptive analysis was reported in place of meta-analysis when $P < 0.05$ and the source of HET couldn't be determined. Egger's regression asymmetry test and funnel plots were to be used to evaluate publication bias. The Trim and Fill technique would be used to account for any publication bias and modify the effect size if Egger's test produced a P value less than 0.1. However, in compliance with current methodological guidelines, funnel plot analysis was not performed because this meta-analysis had fewer than 10 trials.

Country(ies) involved China.

Keywords Respiratory muscle training; Chronic obstructive pulmonary disease; Respiratory symptoms; Symptom severity.

Contributions of each author
Author 1 - Zhenghao Yu.
Author 2 - Hui Huang.
Author 3 - Si Fang.
Author 4 - Li Zhang.