PROTOCOL: Systematic Review and Meta-Analysis on the Effects of Halotherapy on Pulmonary Function, Quality of Life, and Exercise Tolerance in Patients with Chronic Respiratory Disorders

Methods

This systematic review and meta-analysis will be conducted following the PRISMA 2020 guidelines and the Cochrane Handbook for Systematic Reviews of Interventions. The protocol will be registered in the PROSPERO database prior to data collection and analysis.

Search Strategy

A comprehensive literature search will be carried out in PubMed, Scopus, Web of Science, and Cochrane CENTRAL databases, covering all studies published up to October 2025. Search terms will include combinations of the following keywords and MeSH terms: 'halotherapy', 'dry salt inhalation', 'salt cave therapy', 'salt room', 'asthma', 'chronic obstructive pulmonary disease (COPD)', 'bronchitis', and 'bronchiectasis'. Reference lists of included articles will also be reviewed to identify additional relevant studies.

Eligibility Criteria

Studies will be eligible if they meet the following inclusion criteria:
(1) Participants diagnosed with chronic respiratory disorders such as asthma, COPD, chronic bronchitis, bronchiectasis, or ARDS;
(2) Interventions involving halotherapy or dry salt inhalation administered through halochambers or salt aerosol generators;
(3) Comparators including usual care, placebo, or non-halotherapy treatments;
(4) Outcomes measuring pulmonary function (FEV_1, FVC, PEF), quality of life (SGRQ, CAT), or exercise tolerance (6-minute walk test); and
(5) Study designs including randomized controlled trials (RCTs) and non-randomized controlled studies.

Exclusion criteria will include cross-sectional, observational, or case-report designs, conference abstracts, animal studies, and articles without quantitative outcome data.

Study Selection and Data Extraction

Two reviewers will independently screen titles and abstracts, followed by full-text assessment of potentially eligible studies. Discrepancies will be resolved through discussion or consultation with a third reviewer. Data will be extracted on study characteristics, intervention details, comparator conditions, participant demographics, and quantitative outcome measures. Data extraction will be verified for accuracy and completeness.

Risk of Bias Assessment

The methodological quality of randomized controlled trials will be assessed using the Cochrane Risk of Bias 2.0 (RoB 2) tool, while non-randomized studies will be appraised using the ROBINS-I tool. Domains will include randomization process, allocation concealment, blinding, incomplete outcome data, selective reporting, and other potential biases.

Statistical Analysis

Effect sizes will be calculated as standardized mean differences (SMDs) with 95% confidence intervals (CIs). A random-effects model (DerSimonian–Laird method) will be applied when heterogeneity is substantial ($I^2 > 50\%$), otherwise a fixed-effect model will be used. Heterogeneity will be evaluated using Cochran's Q test and the I^2 statistic. Subgroup analyses will be performed according to disease type and age group. Publication bias will be assessed using Egger's test and funnel plot symmetry. All statistical analyses will be conducted using RevMan 5.4 and Comprehensive Meta-Analysis (CMA) v3 software.

Certainty of Evidence

The certainty of evidence for each outcome will be evaluated using the GRADE approach, considering risk of bias, inconsistency, indirectness, imprecision, and publication bias. A Summary of Findings (SoF) table will be prepared to report the overall strength of evidence for key outcomes.