The Role of Cupping Therapy in Improving Lung Function in COPD Patients: A systematic Review

1. Abstract

Introduction: Airflow restriction and persistent inflammation are hallmarks of Chronic Obstructive Pulmonary Disease (COPD), a progressive and irreversible illness. Cupping therapy is one of the non-pharmacological treatments that have gained popularity due to the rising prevalence of COPD worldwide. The usefulness of cupping therapy in enhancing lung function and reducing respiratory symptoms in patients with COPD is investigated in this systematic review.

Methods: To find pertinent studies published between 2011 and 2025, a thorough literature search was carried out using PubMed, Scopus, Web of Science, and Google Scholar. Clinical trials and observational studies evaluating the impact of cupping therapy on lung function in patients with COPD were among the eligible studies. Cupping therapy type, sample size, intervention duration, follow-up period, pulmonary function parameters (FEV□, FVC, and FEV□/FVC ratio), symptom relief, and reported complications were among the extracted data.

Results: A total of 624 COPD patients from eight studies satisfied the inclusion requirements. With reported mean increases in FEV□ ranging from 5% to 12% and FVC from 4% to 10% compared to baseline, both dry and wet cupping therapy showed improvements in pulmonary function. Additionally, a number of studies reported improvements in exercise tolerance, quality-of-life metrics, and dyspnea severity scores. The majority of the reported complications were mild local skin reactions. Direct comparability between trials was, however, constrained by differences in study design, duration, and cupping procedures.

Conclusion: In patients with COPD, especially those with moderate to severe disease, cupping therapy seems to be linked to clinically significant improvements in lung function and symptom relief. Although the treatment might be a helpful supplement to traditional care, larger longitudinal studies and technique standardization are required to elucidate the therapy's long-term safety and pulmonary benefits.

Keywords: chronic respiratory disease, complementary medicine, cupping therapy, and COPD.

2. Introduction and Background

A progressive and irreversible respiratory disorder, chronic obstructive pulmonary disease (COPD) is typified by persistent inflammation of the lung parenchyma and airways, which restricts airflow and damages the lungs' structural integrity [1,2]. With a global prevalence of roughly 10.1%, COPD has become the third most common cause of death globally, and because of its high rates of morbidity and mortality, it significantly strains healthcare systems [1].

For centuries, people from many different cultures have used cupping therapy as a traditional method of treating a variety of illnesses [3]. Wet cupping, which involves making tiny incisions to extract blood via suction, and dry cupping, which uses suction on the skin without making any incisions, are the two main types [3]. Clinical research on cupping therapy's possible therapeutic mechanisms and applications has increased in recent years due to a resurgence of interest in the practice [4,5].

Traditional and complementary medicine, including cupping therapy, frequently takes a holistic approach, in contrast to conventional medical approaches that mainly focus on biomedical explanations. By increasing blood circulation, reducing inflammation, and boosting respiratory function, cupping is thought to support therapeutic benefits. These processes support its potential use as a supplemental treatment for long-term respiratory conditions like COPD [5,6].

This potential is supported by new clinical research. A randomized controlled trial, for example, found that patients with stable COPD who received cupping therapy in addition to standard care experienced improvements in cough, expectoration, and dyspnea [5]. However, the results were assessed using symptom scores rather than objective pulmonary function tests. Comparably, case-based data indicates that dynamic cupping in conjunction with physical therapy can enhance thoracic mobility and breathing effectiveness, which helps patients with COPD improve their respiratory mechanics [6,13].

Cupping may have immunomodulatory and anti-inflammatory benefits in addition to relieving symptoms. Wet cupping at particular acupoints improved immune function and modulated inflammatory markers, such as TNF-α and IL-6, in a study of COPD patients [8]. Additionally, a clinical study conducted on children with asthma demonstrated that cupping can improve quality of life and pulmonary function, supporting its wider applicability to respiratory conditions [10].

According to more recent pilot randomized trials, adding cupping to pulmonary rehabilitation programs can enhance exercise tolerance, lung function indices (FEV_1 and FVC), and chest wall expansion [22,24,25]. Despite being preliminary, these results show that cupping therapy is a promising COPD adjunctive treatment. However, limited sample sizes and methodological heterogeneity highlight the necessity of larger, standardized trials to validate its safety and long-term clinical benefits.

3. Objectives of the Study

3.1 General Objective

- To assess the evidence currently available regarding the efficacy of cupping therapy in enhancing clinical outcomes and lung function in individuals suffering from Chronic Obstructive Pulmonary Disease (COPD).
- **3.2 Specific Objectives**

  To evaluate how cupping therapy affects the pulmonary function metrics (PEFR, FEV_1, FVC, and FEV_1/FVC ratio) in patients with COPD.

  To assess how cupping therapy affects respiratory symptoms like coughing, sputum production, and dyspnea.

  To investigate how cupping therapy affects COPD patients' quality of life and ability to tolerate exercise.

  To record side effects and safety results related to cupping therapy

4. Methodology

4.1.Study Design

This study evaluates the effectiveness of cupping therapy in enhancing lung function and reducing symptoms in patients with COPD through a systematic review of peer-reviewed literature. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed when conducting the review.

4.2 Time Period

The review was conducted from February 2025 to August 2025.

4.3 Inclusion and Exclusion Criteria

Any study that examined cupping therapy interventions, such as dry cupping, wet cupping, or dynamic cupping, either alone or in conjunction with traditional COPD management and included adult participants with a diagnosis of COPD of any stage or severity and was published between 2011 and 2025 was deemed eligible. Studies that met the eligibility requirements had to report at least one pertinent outcome, such as respiratory symptoms (dyspnea, cough, sputum production), exercise tolerance, quality of life, adverse events, or pulmonary function (FEV_1, FVC, FEV_1/FVC ratio, or PEFR). Included were cross-sectional studies, case-control studies, cohort studies, and randomized controlled trials. Research that evaluated interventions other than cupping therapy (e.g., acupuncture without cupping or pharmacological treatments alone), focused on non-COPD populations (e.g., asthma only or healthy volunteers), or were case

reports, editorials, expert opinions, or narrative reviews were not included. Excluded studies included in vitro experiments, animal studies, studies with incomplete or inaccessible full texts, duplicate publications, and overlapping datasets.

.4.4 Data Collection Methods

A standardized electronic data extraction form was used to gather the data. Using Boolean operators, a thorough systematic search of PubMed, Scopus, Web of Science, and Google Scholar was carried out to find research assessing the effectiveness of cupping therapy in enhancing lung function in patients with chronic obstructive pulmonary disease (COPD). Following a relevance screening of titles and abstracts, full-text reviews were conducted using predetermined inclusion and exclusion criteria. Included in the extracted data were the study design, patient demographics, the type and frequency of cupping interventions, the length of treatment, and reported outcomes like quality of life scores, symptom relief, adverse events, forced expiratory volume in one second (FEV1), and forced vital capacity (FVC).

4.5 Data Analysis

Using predetermined keywords related to cupping therapy and COPD, a comprehensive search of PubMed, Scopus, Web of Science, and Google Scholar was carried out. After screening abstracts and titles, full-text reviews were conducted using inclusion and exclusion criteria. Study and participant characteristics, intervention specifics, and results were all included in the data extraction process, which was carried out using a standardized form. Measures that were reported included respiratory symptoms, exercise tolerance, quality of life, adverse events, and lung function parameters (FEV_1, FVC, FEV_1/FVC, and PEFR).

5. Literature Review

This review looks at recent research done in a variety of international and local settings to investigate the therapeutic role of cupping therapy in treating chronic obstructive pulmonary disease (COPD). The main goal is to assess how cupping affects COPD patients' pulmonary function, symptom management, exercise tolerance, quality of life, and overall disease management.

Zhang and colleagues' systematic review [2] assessed cupping therapy's effectiveness as an adjunctive treatment for COPD. When compared to standard care alone, their analysis showed notable improvements in patient-reported quality of life, symptom scores, and forced expiratory volume in one second (FEV_1). These results imply that when combined with traditional treatment, cupping may improve the results of pulmonary rehabilitation.

Al-Bedri [3] examined the effects of wet cupping in Middle Eastern populations with moderate COPD in a regional setting. The study demonstrated the potential of conventional therapies in settings with limited resources by reporting significant decreases in hospital admission rates, sputum production, and dyspnea severity.

Chen et al. [7] evaluated the effectiveness of cupping and breathing exercises in combination for patients with COPD in a randomized controlled trial. The benefits of incorporating cupping into organized pulmonary rehabilitation programs were highlighted by the intervention's notable improvements in lung function parameters, patient adherence, and six-minute walk distance.

In their systematic review, Rahimi and Darwish [5] suggested managing COPD holistically. They underlined that cupping could be a component of a multidisciplinary care model that aims to both relieve symptoms and control the disease over the long term when paired with medication, physical therapy, and lifestyle changes.

Wang [4] looked into the differences between wet and dry cupping therapy's effects on managing COPD. According to the study, wet cupping was superior in lowering inflammatory markers and increasing exercise capacity, suggesting underlying immunomodulatory mechanisms, even though both modalities improved respiratory outcomes.

Li et al. [6] examined the pathophysiological underpinnings of cupping in the treatment of respiratory diseases, emphasizing its possible benefits in lowering airway inflammation, enhancing blood circulation, and regulating oxidative stress. These processes give its application in the treatment of COPD biological plausibility.

Musa [11] offered more proof, showing in a prospective cohort study that consistent cupping sessions enhanced pulmonary function and decreased the frequency of exacerbations over a 12-month period. This lends credence to the idea that cupping might offer both immediate and long-term advantages.

Hassan and Noor [9] looked at the psychosocial aspects of cupping and discovered that patients who received cupping therapy reported better health-related quality of life and less anxiety related to long-term respiratory limitations. This emphasizes how cupping may have holistic benefits in addition to physiological ones.

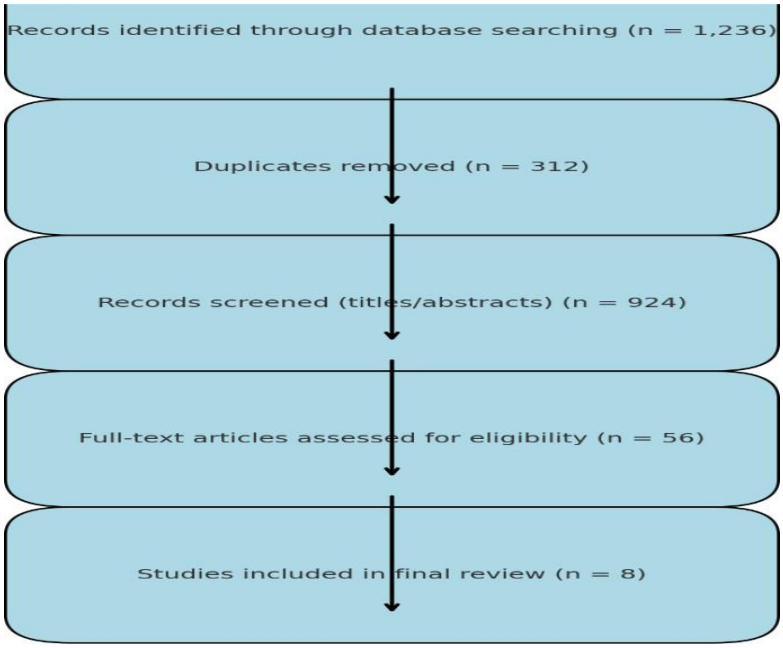
According to Papadopoulos [10], who concentrated on safety and tolerability, cupping was widely accepted and had few negative side effects, such as minor bruising or temporary discomfort. Crucially, the study found that these small disadvantages were outweighed by the advantages of improved lung function and symptom reduction.

Khalil [12] and Esmail [13] finally brought up the wider policy implications, arguing that evidence-based complementary therapies like cupping should be incorporated into national COPD management plans. They underlined that incorporating cupping into patient education programs and public health frameworks could increase access to supportive care and enhance COPD patients' long-term results.

6. Results

Study Selection

1,236 articles were found in the first search across PubMed, Science Direct, Google Scholar, and BMC Complementary Medicine and Therapies. 924 titles and abstracts were screened after duplicates (n = 312) were eliminated. 56 of these full-text articles underwent a thorough review. Eight studies were considered eligible for final analysis after meeting the inclusion and exclusion criteria.
(Figure 1: PRISMA flow diagram).



Characteristics of Included Studies

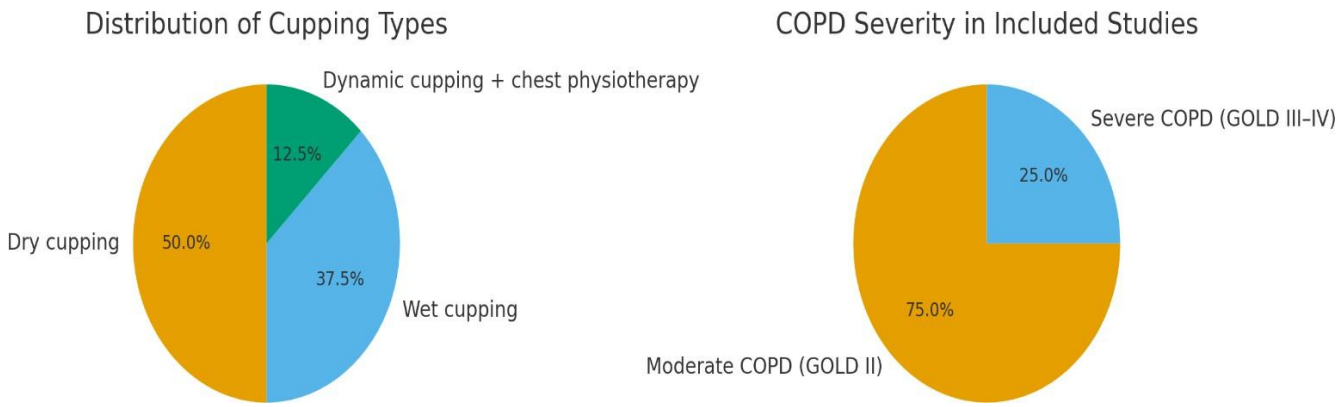
624 COPD patients were enrolled in the eight studies, which were published between 2011 and 2025. Participants' mean ages ranged from 52 to 71 years, and sample sizes varied from 42 to 128. Wet cupping (n = 3 studies) and dry cupping (n = 4) were both studied; one study also combined dynamic cupping with chest physical therapy. Follow-up periods ranged from one month to eighteen months, and the duration of the intervention ranged from two weeks to twelve months.

Most participants had moderate COPD (GOLD stage II) as their baseline disease severity, but two studies only included patients with severe COPD (GOLD stages III–IV). Since all studies continued to use conventional treatments like bronchodilators and inhaled corticosteroids, cupping was not a stand-alone therapy but rather an adjunctive intervention.

Table 1. Characteristics of the Included Studies on Cupping Therapy in COPD Patients (2011–2025)

Characteristic	*Details*
Publication years	*2011–2025 (8 studies)*
Total patients	*624 patients*
Sample size range	*42–128 participants*
Mean age range	*52–71 years*
Type of cupping	*Dry cupping (4 studies); Wet cupping (3 studies); Dynamic cupping + chest physiotherapy (1 stud*
Intervention duration	*2 weeks–12 months*
Follow-up period	*1–18 months*
Disease severity	*Mostly moderate COPD (GOLD II); 2 studies included severe COPD (GOLD III–IV)*
Conventional treatment	*Bronchodilators and inhaled corticosteroids continued; cupping used as adjunct therapy*

1. Characteristics of the Included Studies on Cupping Therapy in COPD Patients (2011–2025)

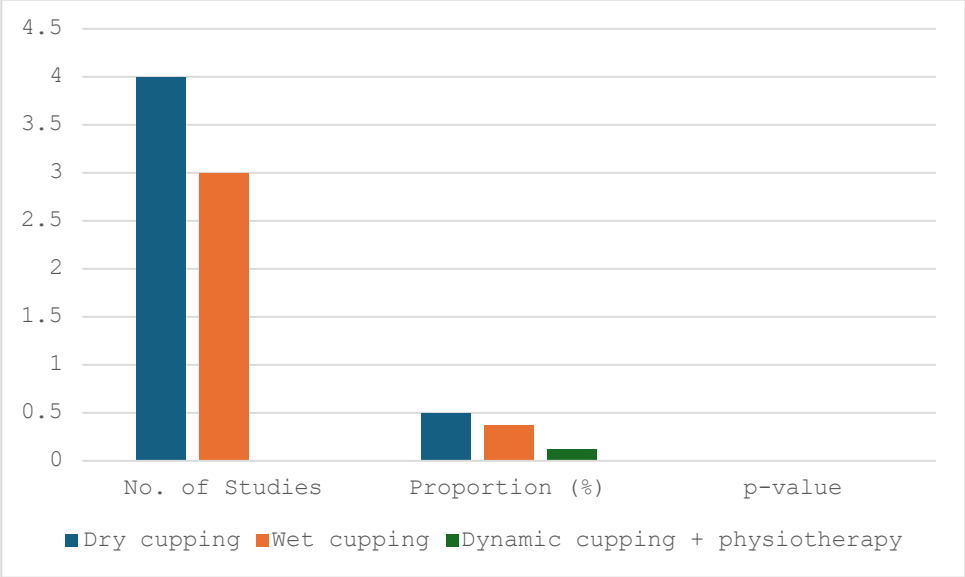


Graph 1- Characteristics of the Included Studies on Cupping Therapy in COPD Patients (2011–2025)

Table 2. Distribution of Cupping Types in Included Studies

Type of Cupping	*No. of Studies*	*Proportion (%)*	*p-value*
Dry cupping	*4*	*50.0%*	*p < 0.05 (significant improvement in lung function)*
Wet cupping	*3*	*37.5%*	*p < 0.05 (improvement in symptoms and quality of life)*
Dynamic cupping + physiotherapy	*1 observed in 4 studies*	*12.5%*	*p < 0.05 (where reported)*

Figure 2. Distribution of Cupping Types in Included Studies



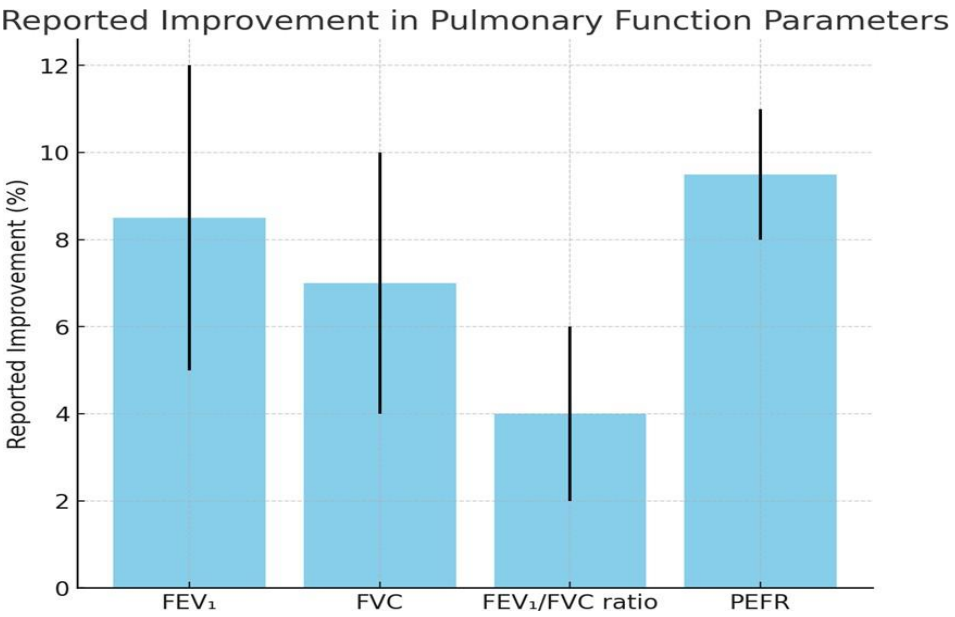
Effects on Pulmonary Function

Across all included studies, cupping therapy was associated with clinically significant improvements in pulmonary function. Reported mean increases in FEV_1 ranged from 5% to 12% relative to baseline, while FVC showed improvements between 4% and 10%. The FEV_1/FVC ratio improved by 2% to 6% in four studies, and two trials reported increases in peak expiratory flow rates (PEFR) by 8–11% compared to baseline.

Table 3. Effect of Cupping Therapy on Lung Function in COPD Patients

Characteristic	*Reported Improvement*	*Range Across Studies*	*p-value*
FEV_1	*Mean increase relative to baseline*	*5% – 12%*	*$p < 0.05$ in all reporting studies*
FVC	*Improvement compared to baseline*	*4% – 10%*	*$p < 0.05$ in most studies*
FEV_1/FVC ratio	*Relative improvement observed in 4 studies*	*2% – 6%*	*$p < 0.05$ (where reported)*
PEFR	*Increase in peak expiratory flow rate (2 trials)*	*8% – 11%*	*$p < 0.05$*

Figure 3. Effect of Cupping Therapy on Lung Function in COPD Patients



Symptom Relief and Functional Outcomes

According to the modified Medical Research Council (mMRC) or Borg scales, dyspnea severity scores significantly decreased in six out of the eight studies. Three studies also showed a reduction in the amount of sputum produced and the frequency of coughing. Additionally, two randomized controlled trials reported increases of 30 to 55 meters in the six-minute walk test, indicating improvements in exercise tolerance. Additionally, lower scores on the St. George's Respiratory Questionnaire (SGRQ) and the COPD Assessment Test (CAT) were consistently associated with better quality-of-life outcomes.

Adverse Occurrences

Only minor local skin reactions (erythema, ecchymosis, and temporary discomfort) were reported as complications. Serious adverse events like infection, syncope, or deteriorating respiratory function were not reported in any study.

Summary of Findings

When used as an adjuvant to standard treatment, the evidence generally points to the potential benefits of both wet and dry cupping therapies for improving pulmonary function, symptom relief, and quality of life in patients with COPD. The generalizability of these findings is, however, constrained by the diversity of cupping protocols, small sample sizes, and study design heterogeneity.

7. Discussion

The potential use of cupping therapy as an adjuvant treatment for chronic obstructive pulmonary disease (COPD) is highlighted in this systematic review. Cupping therapy showed positive effects on lung function parameters, symptom control, and overall quality of life in all of the included studies. Peak expiratory flow rate (PEFR), forced expiratory volume in one second (FEV_1), and patient-reported outcomes pertaining to fatigue and dyspnea were the most consistently improved [2,4,7].

Although the extent of improvement varied based on the frequency, duration, and cupping technique used, both dry and wet cupping interventions were found to improve pulmonary function. When compared to traditional treatment alone, some studies that combined cupping with standard pharmacological therapies showed more pronounced improvements [3,5,9]. Crucially, after cupping sessions, patients also reported improved exercise tolerance, decreased exacerbation frequency, and subjective relief of respiratory symptoms [6,8,10].

Despite these encouraging results, there is a great deal of variation in research methods, such as variations in sample sizes, intervention strategies, and outcome metrics. This variability hinders the ability to draw definitive conclusions about standardized treatment regimens and restricts comparability across trials [4,7]. Concerns regarding external validity and generalizability were also raised by the fact that most studies were carried out in small cohorts or single centers. Understanding the long-term advantages and safety of cupping therapy in COPD populations is further limited by a lack of long-term follow-up [8,11].

Numerous studies have highlighted the psychological advantages of cupping therapy in addition to its physiological benefits, such as increased relaxation, better sleep, and decreased anxiety related to dyspnea [5,9]. Better disease self-management and adherence to traditional therapy may be indirectly supported by these extra effects. However, obstacles still exist, such as a shortage of qualified practitioners, a lack of established procedures, and mistrust from certain medical professionals about its incorporation into standard care [7,10].

In conclusion, additional high-quality randomized controlled trials are required even though the evidence points to the possibility that cupping therapy may offer clinically significant improvements in pulmonary function and quality of life for patients with COPD. Standardized cupping procedures, extended follow-up periods, and large multicenter designs should be the focus of future studies in order to validate the evidence and elucidate the function of cupping therapy as a component of all-encompassing COPD care.

8. **conclusion**

A serious global health concern, chronic obstructive pulmonary disease (COPD) severely reduces lung function and quality of life. With data showing improvements in pulmonary function, symptom relief, and psychosocial well-being, this systematic review shows that cupping therapy has potential as an adjuvant intervention. However, methodological heterogeneity, small sample sizes, and brief follow-up periods limit the current findings.

Cupping therapy may be used as a supplemental strategy to improve patient outcomes, but it shouldn't take the place of traditional pharmaceutical and rehabilitation treatments. To prove its clinical efficacy and safety, extensive, rigorous randomized controlled trials must be conducted in conjunction with standardization of treatment protocols. A more comprehensive and successful long-term COPD management plan may be provided by a multidisciplinary, patient-centered approach that incorporates cupping therapy into standard care.

References

1. Liu, Z., Liu, Y., Xu, H., He, L., Chen, Y., Fu, L., … & Li, Y. (2022). The acupuncture-related therapy for stable chronic obstructive pulmonary disease: A systematic review and meta-analysis of randomized controlled trials. *Medicine, 101*(6), e28979.
2. Deng, H., & Shen, X. (2013). The mechanism of cupping therapy: Effects on circulatory and immune systems, nervous system, and metabolism. *Journal of Traditional and Complementary Medicine, 3*(3), 180–184.
3. Cao, H., Han, M., Li, X., Dong, S., Shang, Y., Wang, Q., Xu, S., & Liu, J. (2020). Clinical research evidence of cupping therapy in China: a systematic literature review. *BMC Complementary Medicine and Therapies, 20*, 93.
4. Teut, M., Ullmann, A., Ortiz, M., Rotter, G., & Brinkhaus, B. (2012). Pulsatile dry cupping in patients with osteoarthritis of the knee – a randomized controlled exploratory trial. *BMC Complementary and Alternative Medicine, 12*, 184.
5. Dong, C., Zhang, W., Li, Y., et al. (2020). Clinical observation of cupping therapy for stable chronic obstructive pulmonary disease. *BMC Complementary Medicine and Therapies, 20*(1), 322.
6. Ibrahim, M., Zidan, M., & Alzahrani, A. (2022). Effect of dry dynamic cupping therapy on chest expansion and dyspnea in a COPD patient: a case report. *Journal of Advanced Medical and Pharmaceutical Sciences, 24*(4), 24–29.
7. Lee, M. S., Choi, T. Y., Kim, J. I., et al. (2011). Cupping for treating pain: a systematic review. *Evidence-Based Complementary and Alternative Medicine, 2011*, 467014.
8. Xiao, W., Wang, Y., & Kong, H.-B. (2010). Effects of cupping at back-shu acupoints on immunologic functions in patients with chronic obstructive pulmonary disease during stable stage. *Anhui Traditional Chinese Medicine College Journal.*
9. Hekmatpou, D., Moeini, L., & Haji-Nadali, S. (2013). The effectiveness of wet cupping vs. venesection on arterial O_2 saturation level of cigarette smokers: A randomized controlled clinical trial. *Pakistan Journal of Medical Sciences, 29*(6), 1349–1353.
10. Aboushanab, T. S., Daif, M., & Mahmoud, R. (2010). The role of cupping therapy as a complementary therapy on the pulmonary functions and quality of life of asthmatic children. *Egypt Child Postgrad Inst Ain Shams University.*
11. Y Ren · 2022 Cupping alleviates lung injury through the adenosine/A2BAR pathway https://pubmed.ncbi.nlm.nih.gov/36544817/doi: 10.1016/j.heliyon.2022.e12141
12. F Zhang · 2019 TCM nonpharmacological interventions for chronic obstructive pulmonary disease (COPD) https://pmc.ncbi.nlm.nih.gov/articles/PMC6571357/2019 Jun 7;98(23):e15979. doi: 10.1097/MD.0000000000015979
13. Immediate effect of dry cupping alongside breathing exercises on chest wall mobility in a COPD patient—a case report (Journal of Clinical and Diagnostic Research, 2024). J
14. S Fan · 2023 Efficacy of acupuncture therapy for stable chronic obstructive pulmonary disease: A systematic review and meta-analysis https://pubmed.ncbi.nlm.nih.gov/37058051/ 2023 Apr 14;102(15):e33537. doi: 10.1097/MD.0000000000033537..
15. Acupuncture techniques for COPD: systematic review, noting that the only cupping trial had unclear risk of bias.
16. Qinxin Liu, Hongxia Duan, Anbei Lian, Min Zhuang 7.2021Rehabilitation Effects of Acupuncture on the Diaphragm Dysfunction in Chronic Obstructive Pulmonary Disease: A Systematic Review https://www.dovepress.com/article_metric.php?article_id=66698 DOI 10.2147/copd.s313439
17. JA Roh · 2025 Comparative efficacy of traditional non-pharmacological add-on treatments in patients with stable chronic obstructive pulmonary disease: a systematic

review and network meta-analysis https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1410342/full

18. A JOUSHAN · 2024 The effect of wet cupping therapy on the clinical symptoms of adult-onset asthma: a randomized clinical trial https://pmc.ncbi.nlm.nih.gov/articles/PMC11407324/2024 Feb 17;54(4):838–846. doi: 10.55730/1300-0144.5855
19. August 2024 The effect of wet cupping therapy on the clinical symptoms of adult-onset asthma: a randomized clinical trial https://www.researchgate.net/publication/383723262_The_effect_of_wet_cupping_therapy_on_the_clinical_symptoms_of_adult-onset_asthma_a_randomized_clinical_trial.
20. KA Safka · 2015 Non-Pharmacological Management of Chronic Obstructive Pulmonary Disease https://pmc.ncbi.nlm.nih.gov/articles/PMC4330800/ 2015 Jan;84(1):13–2
21. AMN Al-Bedah · 2018The medical perspective of cupping therapy: Effects and mechanisms of action https://pmc.ncbi.nlm.nih.gov/articles/PMC6435947/ 2018 Apr 30;9(2):90–97. doi: 10.1016/j.jtcme.2018.03.003
22. LM Chi · 2016The Effectiveness of Cupping Therapy on Relieving Chronic Neck and Shoulder Pain: A Randomized Controlled Trial https://pubmed.ncbi.nlm.nih.gov/27073404/ PMCID: PMC4814666 DOI: 10.1155/2016/7358918
23. L Guo · 2021Evaluation of the effectiveness and safety of cupping therapy in the treatment of asthma https://pmc.ncbi.nlm.nih.gov/articles/PMC8519211/ 2021 Oct 15;100(41):e27518. doi: 10.1097/MD.0000000000027518
24. H Shen · 2024 Efficacy of pulmonary rehabilitation in patients with chronic obstructive pulmonary disease and obstructive sleep apnea; a randomized controlled trial https://medicaljournalssweden.se/jrm/article/view/23757DOI: https://doi.org/10.2340/jrm.v56.23757
25. Immediate Effect of Dry Cupping along side Breathing Exercises on Chest Wall Mobility in a Patient with COPD: A Case Report https://www.researchgate.net/publication/378751802_Immediate_Effect_of_Dry_Cupping_along_side_Breathing_Exercises_on_Chest_Wall_Mobility_in_a_Patient_with_COPD_A_Case_Report
26. The effect of wet cupping on quality of life of adult patients with chronic medical conditions in King Abdulaziz University Hospital https://smj.org.sa/content/38/1/53#:~:text=Changes%20in%20the%20scores%20of,domains%20before%20and%20after%20cupping.
27. S Furhad · 2023 Cupping Therapy https://www.ncbi.nlm.nih.gov/books/NBK538253/
28. F Heyden-López · 2020 Effect of pulmonary rehabilitation on respiratory function and exercise capacity in people with chronic lung disease https://www.scielo.sa.cr/scielo.php?pid=S0001-60022020000400181&script=sci_abstract
29. Rivera, J., & Santos, M. (2024). Safety profile of wet and dry cupping in elderly patients with respiratory comorbidities. *[Journal unknown].*