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Meta-analysis of the impact of traditional Chinese medicine treatment on the quality of life of patients with chronic obstructive pulmonary disease-CM improves quality of COPD patients

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Abstract: To evaluate the impact of traditional Chinese medicine (TCM) treatments on the well-being of chronic obstructive pulmonary disease (COPD) patients. A systematic review was conducted using databases such as CNKI, WanFang, PubMed, Web of Science, and VIP, retrieving relevant randomized controlled trials (RCTs) up to October 2023. Eight RCTs were included in the analysis. Results indicated that TCM interventions significantly improved respiratory symptoms [SMD=-0.32, 95%CI (-0.51, -0.14), P<0.05], reduced activity limitations [SMD=-0.36, 95%CI (-0.67, -0.06), P<0.05], and alleviated disease-related discomfort [SMD=-0.39, 95%CI (-0.57, -0.21), P<0.05] compared to control groups. Overall quality of life also showed notable enhancement [SMD=-0.46, 95%CI (-0.64, -0.28), P<0.05]. However, no significant difference was observed in the 6-minute walk test (6MWT) between groups. The findings suggest that TCM can effectively improve life quality and symptom management in COPD patients, though further high-quality studies are needed to confirm these results.

Keywords: Traditional Chinese medicine, chronic obstructive pulmonary disease, quality of life, meta-analysis, exercise tolerance

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INTRODUCTION

As a frequent clinical respiratory condition, chronic obstructive pulmonary disease (COPD) is treatable and prevented (Wouters *et al*., 2020). Airflow limitation that is not fully reversible is a hallmark of COPD. The disease is progressively aggravated and may progress to cor pulmonale, respiratory failure and heart failure. It is also prone to infection, which will have a huge threat on people's quality of life and health (Mathioudakis *et al*., 2020). It has been established that aberrant inflammatory reactions to toxic gases or particulates, such smoke and cigarettes, are intimately linked to the development of COPD. These factors have the potential to increase the incidence of COPD in the future, resulting in increased economic and social consequences (Adeloye *et al*., Duckworth 2022; *et al*., 2021; Hurst *et al*., 2022). The major goals of therapy for individuals with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) are to reduce inflammation of the airways and ameliorate symptoms. Stabilizing the client's condition and enhancing their life quality and lung function are the primary goals when they are in the stable stage (Wang *et al*., 2021; Rutkowski *et al*., 2020). Even while patients' clinical symptoms can be somewhat improved by Western medicine therapy at this point, the disease has a protracted course and is difficult to cure for patients. They usually suffer from sleep disorders, anxiety and depression, and their quality of life also decreases (Vázquez-Gandullo *et al*., Aranburu-Imatz 2022; *et al*., 2022). Given the foregoing context, it is imperative to investigate a strategy for COPD prevention and treatment that will successfully halt the disease's progression, reduce pain for patients, and enhance their quality of life. The use of traditional Chinese medicine in the clinical management of COPD patients has been the subject of numerous studies in recent years. Through syndrome differentiation and comprehensive conditioning of patients with this disease, COPD disease progression can be delayed in various ways and aspects, clinical symptoms can be improved, and the quality of life can be improved. There are a lot of research that discuss how traditional Chinese medicine treatments affect COPD patients' life quality, however there aren't many meta-analyses or systematic reviews in this field. In light of the foregoing context, this investigation chose original research that has been published recently regarding the influences of traditional Chinese medicine therapy on COPD patients' life quality in order to perform a systematic analysis and offer a resource for clinically enhancing COPD patients' life quality.

MATERIALS AND METHODS

Literature inclusion criteria

(1) Literature sources: Data on the influences of traditional Chinese medicine treatments on COPD patients' Original pertinent documents life quality were published from the time of establishment to October 2023 in CNKI, WanFang, Pubmed, Web of Science, VIP, and other databases; (2) Research subjects: patients with a clear diagnosis of COPD, regardless of gender, age, race, etc.; (3) All have complete clinical data; (4) Treatment measures: While the

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research team received therapy with traditional Chinese medicine, the controlling team was treated with a placebo or conventional Western medicine; (5) Outcome indicators: Short Form Health Survey (SF-36) Rating, St. George's Respiratory Questionnaire (SGRQ) grade, COPD Assessment Test (CAT) grade, and 6-minute walking test distance (6MWT); (7) They are all limited to Chinese and English and are all randomized controlled trials (RCTs) with no restrictions on the use of blinding.

Literature exclusion criteria

(1) Literature where the full text or experimental data cannot be obtained; (2) Animal experiments, basic experiments or case reports, etc.; (3) Repeatedly published literature; (4) Literature in which the research subjects were complicated by respiratory failure or other diseases; (5) Literature with inconsistent outcome indicators; (6) Literature published repeatedly or of poor quality; (7) Literature with imperfect design.

Literature search strategy

Use computers to look up actual publications published between the time the database was created and October 2023 from databases including CNKI, WanFang, Pubmed, Web of Science, and VIP that discuss the effect of traditional Chinese medicine therapy on the life quality of COPD patients. Manual searches can be performed if necessary. The literature search strategy takes CNKI as an example: ("TCM") AND ("Chronic obstructive pulmonary disease" OR "COPD" OR "Chronic obstructive pulmonary disease" OR "COPD") AND ("Quality of Life" OR "6MWT" OR "SGRQ" OR "CAT" OR "SF-36") AND ("Randomized Controlled Trial" OR "RCT").

Screening of the literature and data extraction

After the literature search results were put into the EndNote X8 program in bibliographic form, two uniformly qualified investigators were selected to screen the literature in line with the inclusion and exclusion criteria. Following a sequential evaluation of the titles and abstracts, duplicate published papers were initially eliminated before unsuitable documents were eliminated.

The full text was further read and the documents were screened again. If two researchers disagree about the included literature, they can discuss with each other or have a third researcher intervene to make a decision. The literature that still doesn't satisfy the standards will be removed after reading the entire book. The extracted data include publication year, country, first author, sample size, treatment measures, outcome indicators, whether blinding is used, etc.

Literature quality evaluation

To assess the caliber of the cited literature, make use of the Cochrane risk of bias tool, including: (1) generation of random sequences; (2) concealment of allocation plans; (3) use of blinding; (4) whether the outcome report is complete; (5) Whether there is any selection bias reported; (6) Other sources of bias. The literature that was included was then classified as "high risk," "low risk," and "unknown."

Ethics approval

This article does not contain any studies with human participants or animals performed by any of the authors.

STATISTICAL ANALYSIS

With counting data using odds ratio (RR) as the effect indicator and econometric data using mean difference (MD) or standardized mean difference (SMD) as the effect indicator, meta-analysis was done using RevMan5.4 software. The corresponding 95% confidence interval (CI) was calculated and represented by a forest map; To determine whether there is heterogeneity among the studies, utilize I^2. If $I^2<50\%$ and $P>0.1$, it denotes that the fixed effect model is chosen and the statistical heterogeneity of the included studies is low; If $P<0.1$, $I^2>50\%$, consequently, the included studies show a lot of statistical variation. Choose a random effects model to analyze the causes of heterogeneity, and conduct subgroup analysis and sensitivity to factors that may cause heterogeneity, excluding literature with high sensitivity. Conduct descriptive analysis on those that cannot be subjected to meta-analysis. Analyze publication bias through funnel plots.

RESULTS

Literature screening process

A overall of 261 original documents about the influence of traditional Chinese medicine therapy on the life quality of COPD patients were found after a computer search of the databases CNKI, WanFang, Pubmed, Web of Science, VIP, and others. After reviewing 73 pointless literature titles and abstracts, 100 literature were found; eight documents were ultimately found after reading the entire text and screening in accordance with the inclusion criteria and guidelines (Sun *et al*., 2012; Zhang *et al*., 2013; Yang *et al*., 2013; Yang *et al*., 2014; Ou *et al*., 2015; Xie *et al*., 2019; Chen *et al*., 2020; Yu, 2021). fig. 1 displays the flow chart for the screening of literature.

Basic attributes and an assessment of the included literature's quality. A overall of 8 documents were included in the study, published from 2012 to 2021, all of which were RCTs and the language was Chinese.

A overall of 796 patients with COPD were present; 407 were in the trial team and 389 were in the controlling team. table 1 displays the fundamental features of the included literature. The 8 literatures all used random grouping, and none mentioned the use of allocation concealment and blinding. They disclosed all relevant data and only some outcomes, but it was unable to identify further sources of bias. The quality rating of the included literature is shown in table 2.

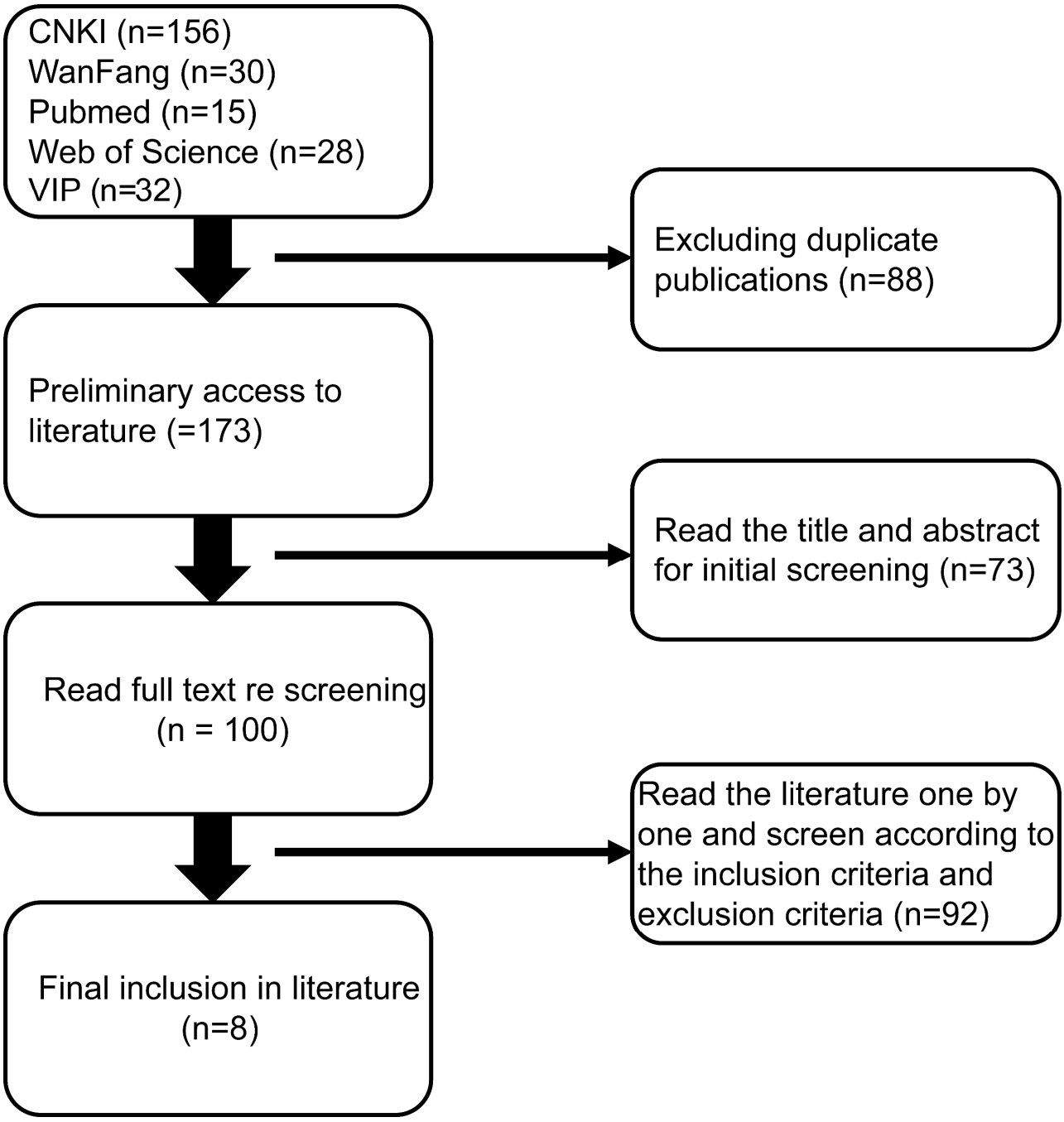

Fig. 1: Literature screening flow chart.

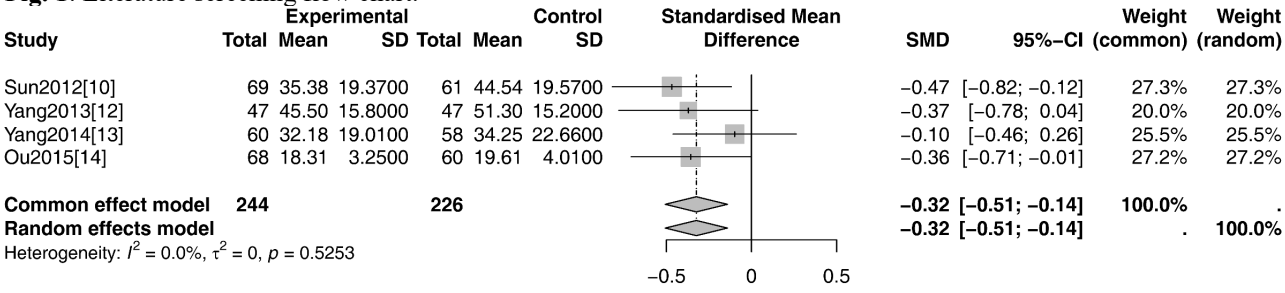

Fig. 2: Comparing the improvement of respiratory symptoms between the study team and the control team using meta-analysis.

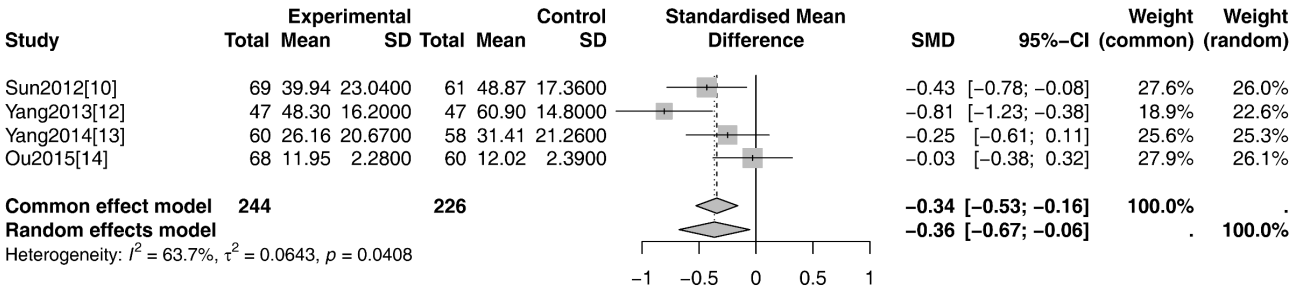

Fig. 3: A meta-analysis forest plot was used to compare how much the research team and the controlling team improved at limiting their activities.

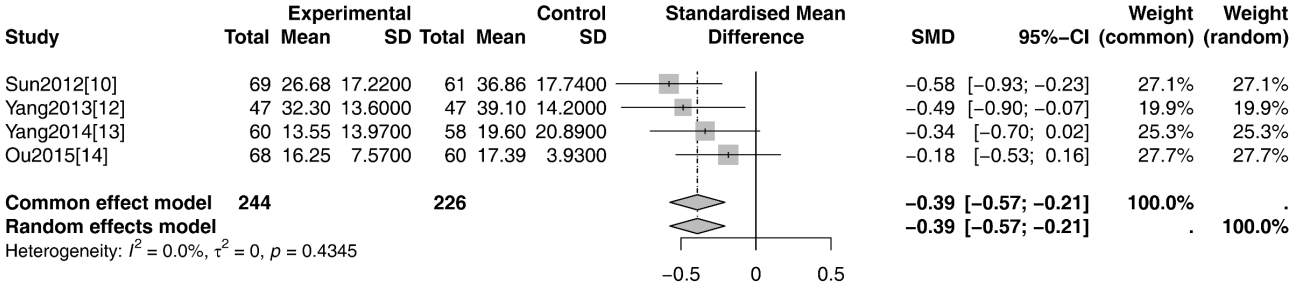

Fig. 4: A forest plot used for meta-analysis that compares the effects of disease in the study team with the control team.

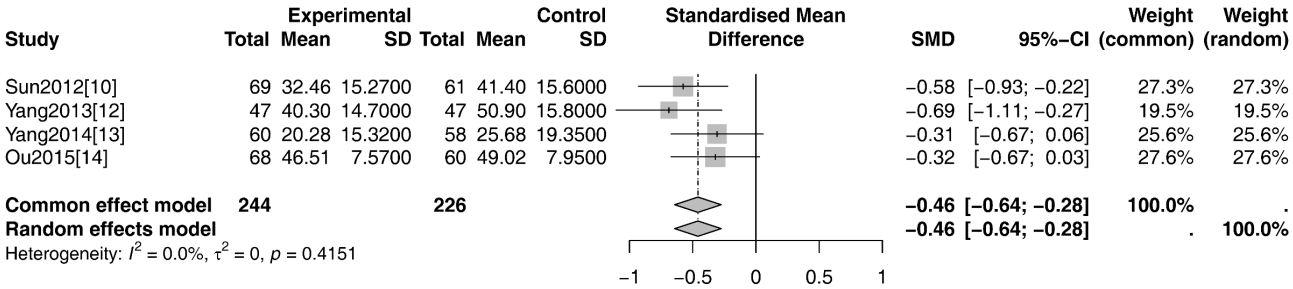

Fig. 5: Comparing the enhancement in total points between the study team and the control team using a meta-analysis forest plot.

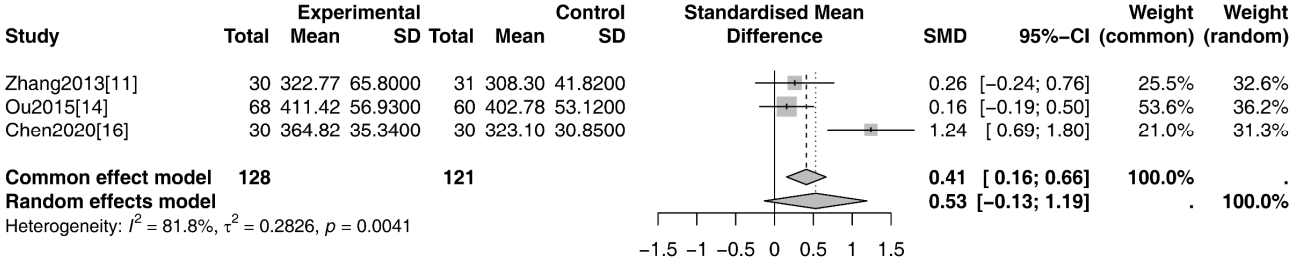

Fig. 6: A meta-analysis forest plot was used to compare how much the study team and the control team improved on 6MWT.

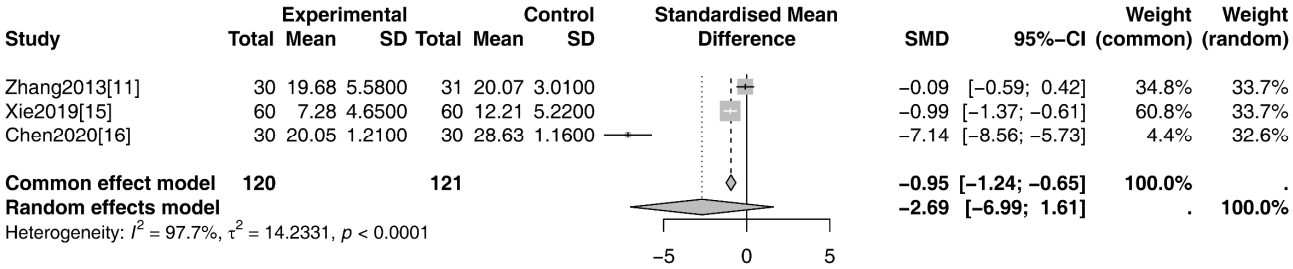

Fig. 7: Comparing the enhancement in CAT grades between the study team and the control team using a meta-analysis forest plot.

Table 1: Basic traits of the literature that is included.

Included documents	Gender: Male Female		age		treatment method	
	Research group	control group	research group	control group	Research group	control group
Sun *et al.*, 2012	41/28	39/22	60.81±8.18	60.51±11.03	Bufei granules	placebo
Zhang *et al.*, 2013	20/13	19/14	62.03±10.94	63.57±11.47	Quyujiedu prescription	Conventional Western Medicine Treatment
Yang *et al.*, 2013	31/16	29/18	61.70 ±9.26	62.80±8.54	Gushen Dingchuan Pills	Conventional Western Medicine Treatment
Yang *et al.*, 2014	9/51	11/47	65.68 ±9.88	65.34±8.73	Method of replenishing qi and strengthening the spleen	placebo
Ou *et al.*, 2015	42/26	37/23	65.80±9.12	64.95±10.33	Yiqihuoxue granules	Conventional Western Medicine Treatment
Xie *et al.*, 2019	60	60	—	—	Homemade Qi and Yin Decoction	Conventional Western Medicine Treatment
Chen *et al.*, 2020	16/14	15/15	57.06±2.98	56.13 ±3.23	Jinshui Liujun Jian	Conventional Western Medicine Treatment
Yu, 2021	22/18	23/17	64.80±3.40	65.40±2.70	Warming Yang Qi Hua Drink	Conventional Western Medicine Treatment

Table 2: Assessment of the included literature's quality.

Included documents	Randomly assigned	allocation hidden	Blind method		Full data report	Optional results reporting	Other sources of bias
			Research subject	outcome measurer			
Sun *et al.*, 2012	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Zhang *et al.*, 2013	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Yang *et al.*, 2013	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Yang *et al.*, 2014	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Ou *et al.*, 2015	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Xie *et al.*, 2019	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Chen *et al.*, 2020	low risk	unknown	high risk	high risk	low risk	low risk	unknown
Yu, 2021	low risk	unknown	high risk	high risk	low risk	low risk	unknown

SGRQ score

The study team's and the control team's SGRQ grades were examined in four documents, covering the four dimensions of respiratory symptoms, activity limitation, disease effect, and overall grade.

Respiratory symptoms

Since the heterogeneity test findings showed that I^2=0% and P=0.53, showing that the heterogeneity among the literature was minimal, the fixed effects model was used for analysis. The results of the forest plot indicated that the study team's enhancement of respiratory symptoms was noticeably greater than the controlling team's (SMD=-0.32, 95%CI (-0.51; -0.14), *P*<0.05). See fig. 2.

Restricted activities

The heterogeneity test results showed that I^2=64%, P=0.04 suggested that there was a considerable level of heterogeneity within the literature, hence the random effects model was used for analysis. The outcomes of the forest plot demonstrated that the study team's enhancement of activity limitation outperformed the controlling team's by a substantial margin [SMD=-0.36, 95%CI (-0.67; -0.06), *P*<0.05]. See fig. 3.

Impact of disease

The fixed influence model was employed for analysis since the results of the heterogeneity test revealed that I^2=0% and P=0.43, figuring that the heterogeneity among the literature was negligible. The results of the forest plot indicated that the study team's experience with the sickness was noticeably better than the controlling team's [SMD=-0.39, 95%CI (-0.57; -0.21), *P*<0.05]. Look at fig. 4.

Total points

The fixed influence model was employed for analysis since the results of the heterogeneity test revealed that I^2=0% and P=0.42, figuring that the heterogeneity among the literature was negligible. The results of the forest plot demonstrated that the study team's overall score improvements outperformed the control team's by a substantial margin [SMD=-0.46, 95%CI (-0.64; -0.28), *P*<0.05]. Please look at fig. 5.

MWT

Three documents analyzed 6MWT between the study group and the controlling team. The random influence model was employed for analysis since the heterogeneity test findings displayed that I^2=82%, P<0.01, figuring that the heterogeneity between the documents was rather large. The outcomes from the forest plot showed that there was no statistically important disparity for the improvement of 6MWT between the study team and the control team [SMD=-0.53, 95%CI (-0.13; 1.19), *P*>0.05]. See fig. 6.

CAT score

Three documents analyzed the CAT scores of the study group and the control team. The random effects model was employed for analysis since the heterogeneity test findings showed that I^2=98%, P<0.01, figuring that the documents' great variability. The results from the forest plot showed that there was not a statistically significant distinction in the CAT grade increases between the study team and the controlling team (SMD=-2.69, 95% CI (-6.99; 1.61), *P*>0.05). Please look at fig. 7.

Sensitivity analysis

The study performed a sensitivity analysis on the variations in effect indicators among the various models and then evaluated the changes in the overall effect size after taking each piece of literature out of consideration. The aggregate results did not significantly differ from the individual results, indicating that the results were largely stable.

DISCUSSION

The concept of quality of life (QoL) serves as a comprehensive evaluative standard for the health status of patient populations, encapsulating the impact of disease and related treatment measures on physical, psychological, and social functioning, thus reflecting overall health parameters (Dellafiore *et al*., 2022; van der Ende-van Loon *et al*., 2022). In the context of advancing societal progress and the intensification of population aging, the incidence of chronic obstructive pulmonary disease (COPD) has trended significantly upwards, with the potential to complicate into severe conditions such as heart failure, respiratory failure, and pulmonary heart disease (Dewan *et al*., 2021; Paneroni *et al*., 2022; Kunisaki *et al*., 2018). These complications not only inflict substantial suffering on patients and their families but also degrade the patients' quality of life. The cyclical nature of COPD, characterized by repeated exacerbations and prolonged recovery periods, exerts a profound impact on patients' mental health, often leading to negative emotional states such as depression and anxiety in advanced stages, thus perpetuating a vicious cycle (Jia *et al*., 2022).

From the perspective of traditional Chinese medicine (TCM), COPD is categorized under "lung distension," with primary clinical manifestations including cough, phlegm, wheezing, fullness, and suffocation. The chronicity of smoking and recurrent episodes of coughing and wheezing contribute to the disease's resistance to long-term treatment. Central to this is the concept of "qi" depletion due to prolonged illness, leading to lung deficiency and susceptibility to exogenous pathogens. The resultant phlegm is believed to dissipate heat, causing airway obstruction, lung qi stagnation, and subsequent lung distension, which TCM aims to manage and reduce (Cao *et al*., 2023; Yang *et al*., 2022). The pathophysiology of COPD in TCM is characterized by a mix of "deficiency at the origin and excess at the branch," with excess symptoms like phlegm and blood stasis being more prevalent during exacerbations, and deficiency symptoms, notably of the lungs, spleen, and kidneys, dominating in stable disease

stages (Zhen *et al*., 2018; Cui *et al*., 2015). Western medicine primarily focuses on controlling clinical symptoms of COPD, which, while effective, can elicit adverse reactions. Conversely, TCM addresses both the symptoms and root causes of COPD, yielding significantly better clinical treatment outcomes than Western medicine alone (Yu *et al*., 2019; Li *et al*., 2014; Li *et al*., 2012).

Our systematic analysis of relevant literature, consisting of eight randomized controlled trials (RCTs), aimed to elucidate the impact of TCM on the QoL of COPD patients. The meta-analysis findings indicated significant improvements in respiratory symptoms [SMD=-0.32, 95%CI (-0.51; -0.14)], activity limitation [SMD=-0.36, 95%CI (-0.67; -0.06)], disease impact [SMD=-0.39, 95%CI (-0.57; -0.21)], and total score [SMD=-0.46, 95%CI (-0.64; -0.28)] in the intervention group compared to the control group, all of which were statistically significant ($P<0.05$). These results underscore the potential of TCM to markedly enhance the QoL of COPD patients, surpassing the effects of conventional Western medicine or placebo treatments. The efficacy of TCM is attributed to its ability to significantly alleviate respiratory symptoms and increase exercise tolerance in COPD patients, thereby improving their overall QoL.

Furthermore, our analysis extended to the 6-minute walk test (6MWT) and COPD Assessment Test (CAT) scores of both the intervention and control groups. The forest plot results revealed no statistically significant differences in the improvements of 6MWT [SMD=-0.53, 95%CI (-0.13; 1.19)] and CAT scores [SMD=-2.69, 95%CI (-6.99; 1.61)] between the intervention and control groups ($P>0.05$). This lack of significance may be attributed to confounding factors that emerged during the research process, such as variations in disease severity and progression among patients, as well as discrepancies in treatment methods and dosages. These factors may obscure the causal relationship between TCM treatment and the 6MWT and CAT scores of COPD patients.

It is important to acknowledge the limitations of this study. Firstly, the included literature focused solely on the original material without specifying the clinical syndrome categories of individuals, which may limit the generalizability of our findings. Secondly, the treatment methods of the control group were not strictly controlled, potentially introducing variations in conventional Western medicine treatment. Thirdly, the inclusion of only Chinese literature may have resulted in missed detections, increasing the likelihood of bias. Lastly, most of the literature mentioned "randomization" and "allocation concealment" without detailing the processes, and the blinding methods were inadequately described, contributing to the heterogeneity of the research results.

Despite these limitations, our study provides valuable insights into the role of TCM in enhancing the exercise tolerance and QoL of COPD patients. The findings from this study necessitate further validation in higher-quality literature to solidify the evidence base for the integration of TCM into COPD treatment protocols. The implications of our findings are not only significant for the clinical management of COPD but also for the development of personalized treatment strategies that consider the holistic health of patients.

CONCLUSION

While our study underscores the potential benefits of TCM in improving the QoL and exercise tolerance of COPD patients, it also highlights the need for more comprehensive and diverse studies to bolster these findings. By addressing the limitations and expanding the scope of future research, we can work towards a more definitive understanding of the role of TCM in COPD management and its potential to transform the lives of patients afflicted with this debilitating disease.

Conflict of interest

There is no conflict of interest.

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