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ORIGINAL RESEARCH

Acupuncture for Chronic Obstructive Pulmonary Disease: A 38-Year Bibliometric Landscape of Global Research Trends and Knowledge Evolution (1986–2024)

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Background: Despite growing interest in acupuncture as a complementary therapy for chronic obstructive pulmonary disease (COPD), comprehensive analyses of its global research trajectory, disciplinary convergence patterns, and geopolitical contributions remain unexplored. This study addresses this gap by mapping the intellectual and geopolitical architecture of acupuncture-COPD research over nearly four decades, a period chosen to capture the significant developments in acupuncture's global recognition since the late 1980s, when traditional medicine began to gain more global attention.

Methods: We conducted a longitudinal bibliometric analysis of 299 publications indexed in the Web of Science Core Collection (1986–2024). Employing Bradford's and Lotka's laws, co-citation networks, and keyword co-occurrence clustering, we systematically evaluated temporal productivity trends, institutional/country contributions, citation dynamics, and thematic evolution using SciMAT, VOSviewer, and bibliometrix R-package. (Response to Editor's Comment 1).

Results: Research productivity followed a triphasic trajectory: a dormant phase (1986–2000, ≤2 articles/year), a stabilization phase (2001–2014, +4% annual growth), and an exponential growth phase (2015–2024, 13 articles/year), closely aligned with global policy shifts in traditional medicine. China emerged as the dominant contributor (338 articles, 64.2% global output), yet Canada demonstrated superior research impact (108 citations/article), highlighting a productivity-impact paradox. Mechanistic investigations into neuroimmunological pathways, particularly μ-opioid receptor modulation (centrality 0.74), became central research pillars, reinforced by biomarker-correlated clinical trials showing β-endorphin-FEV1 interactions ($r = 0.526$, $p = 0.008$). Persistent translational gaps were evident, with 63% of RCTs relying on subjective "deqi" assessments despite technological advances in objective acupuncture monitoring.

Conclusion: This analysis reveals critical asymmetries between Eastern research productivity and Western methodological innovation in acupuncture-COPD research. This analysis suggests a need for a threefold strategy integrating multiscale neuroimaging validation, globalized trial standardization through CONSORT-Acupuncture frameworks, and equitable North-South knowledge exchange to address the growing burden of COPD-related dyspnea in aging populations.

Keywords: acupuncture, COPD, bibliometrics, neuroimmunology, research disparities, traditional medicine

Introduction

Chronic obstructive pulmonary disease (COPD), a progressive respiratory disorder characterized by irreversible airflow limitation and systemic inflammation, is one of the top three causes of death worldwide.[1] According to a global burden of disease study, COPD was the fifth leading cause of global disability-adjusted life-year loss in 2020.[2] The current standard treatment for COPD primarily focuses on symptom management through pharmacological interventions such as bronchodilators and corticosteroids, as well as non-pharmacological approaches like pulmonary rehabilitation.[3,4]

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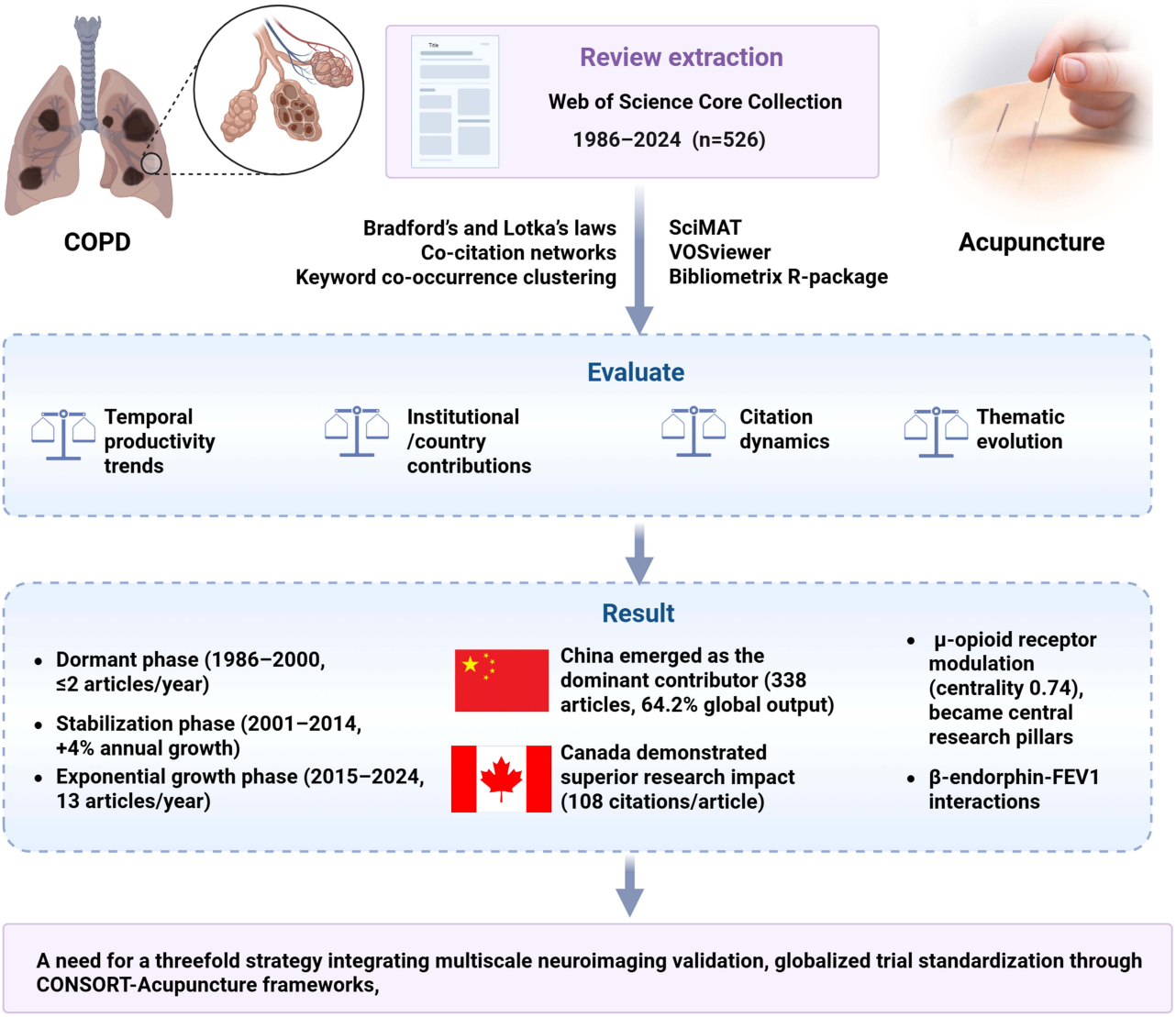
Graphical Abstract



However, these treatments have limited efficacy and are often associated with significant side effects, including peptic ulcers, immune deficiency, and osteoporosis.[5] Moreover, despite temporary symptom relief, COPD remains incurable with high recurrence rates, therefore, Global Initiative for Chronic Obstructive Lung Disease (GOLD) guideline states that nonpharmacological treatment is complementary to pharmacological treatment and should form part of the comprehensive management of COPD.[6]

Acupuncture, rooted in Traditional Chinese Medicine (TCM), has gained international recognition as a complementary and alternative therapy for various health conditions, including COPD.[7–9] Acupuncture therapy, through the stimulation of specific body surface areas or acupuncture points, can significantly improve clinical symptoms in COPD patients, reduce relapse rates, and provide a complementary approach to address the limitations and side effects of conventional Western medicine.[10,11] It is also characterized by its simplicity, safety, and affordability. Mechanistically, acupuncture has been shown to inhibit chronic inflammatory pathways, modulate immune responses, and enhance antioxidant capacity.[12]

To better understand the long-term trends and evolution of acupuncture research in the treatment of COPD, we selected a 38-year period for our bibliometric analysis. This 38-year period was chosen because it provides a comprehensive view of how the research landscape in acupuncture and COPD has developed. A 38-year window captures the early stages of acupuncture research in COPD, offering insights into the foundational work that shaped the field, while also allowing for an examination of more recent trends and advancements. A shorter time frame, such as 30 or 35 years, would not encompass some of the early key studies that set the stage for later research, whereas a longer period, such as 40 years, would include less relevant data due to shifts in research methodologies and technological advancements in data analysis. Therefore, we believe that 38 years offers a balanced and appropriate timeframe for analyzing the evolution of research in this field.

Acupuncture has been widely explored as a complementary therapy in the management of COPD, showing promising results in improving symptoms such as dyspnea, cough, and fatigue, as well as enhancing lung function and quality of life.[13] Studies have suggested that acupuncture may reduce inflammation, regulate immune responses, and improve pulmonary circulation in COPD patients.[14] However, the benefits and risks of acupuncture in COPD remain subjects of ongoing debate. On one hand, acupuncture has been shown to alleviate symptoms and improve the patient's overall well-being with minimal side effects. On the other hand, there are concerns regarding the lack of standardization in acupuncture techniques, as well as potential risks such as infection if needles are improperly used. Some studies have also raised concerns about the risk of misdiagnosis or inappropriate treatment in patients with more severe stages of COPD. Overall, while acupuncture presents a promising adjunct therapy, further clinical studies with larger sample sizes and standardized protocols are required to confirm its efficacy and safety for COPD management.

Bibliometric analysis, a quantitative and qualitative method used to analyze literature sets, involves constructing data matrices for co-citation, coupling, scientific collaboration and co-word analysis.[15] Compared with traditional integrative reviews, bibliometric methods can provide more reliable and objective analytical results. In recent years, numerous studies have been conducted on the clinical efficacy and mechanisms of action of acupuncture in the treatment of COPD, demonstrating its promising application prospects in clinical practice. Analyzing and exploring research in this field may provide new directions and strategies for the further application of acupuncture in the clinical treatment of COPD. After searching PubMed, Embase and Web of Science, we found that there is still a lack of bibliometric analyses specifically targeting this field. To address this knowledge gap, this study conducted a bibliometric analysis of the application of acupuncture in COPD, examining the major contributing countries, institutions, authors, and the current state of research, and tracking its developmental characteristics and future trends.

To better understand the long-term trends and evolution of acupuncture research in the treatment of COPD, we selected a 38-year period for our bibliometric analysis. During this time, the research landscape evolved through a triphasic trajectory, which refers to a three-phase progression: (1) an initial dormant phase (1986–2000) marked by limited publications, (2) a stabilization phase (2001–2014) where research activity increased at a moderate pace, and (3) an exponential growth phase (2015–2024), characterized by a dramatic rise in publications. This triphasic pattern highlights the evolving global interest in acupuncture as a complementary therapy for COPD, influenced by factors such as increased awareness, funding, and changes in healthcare policies.

Method

Data Collection

We conducted a data search of the Web of Science Core Collection (WOSCC) on 26 February 2024. The search formula was: ((((((TS = (Chronic Obstructive Pulmonary Disease)) OR TS = (COPD)) OR TS = (Chronic Obstructive Lung Disease)) OR TS = (Chronic Obstructive Airway Disease)) OR TS = (COAD)) OR TS = (Chronic Airflow Obstruction)) AND ((((((((((((TS = (Acupuncture)) OR TS = (Acupuncture Therapy)) OR TS = (Acupuncture Treatment)) OR TS = (Pharmacoacupuncture Treatment)) OR TS = (Acupuncture)) OR TS = (Moxibustion)) OR TS = (Electroacupuncture)) OR TS = (Electroacupuncture)) OR TS = (Manual Acupuncture)) OR TS = (Dry Needle)) OR TS = (Warm Needling)) OR TS = (Acupuncture Point Injection)) OR TS = (Acupuncture Point Embedding)). A total of 299 publications with the document type "article" in the English language, downloaded in both "BibTeX" and "Plain Text" file formats were included (Figure 1). In addition, the following exclusion criteria were applied: (1) studies published before 2019, and (2) studies without a control group or case report studies. (Response to Editor's Comment 1.3).

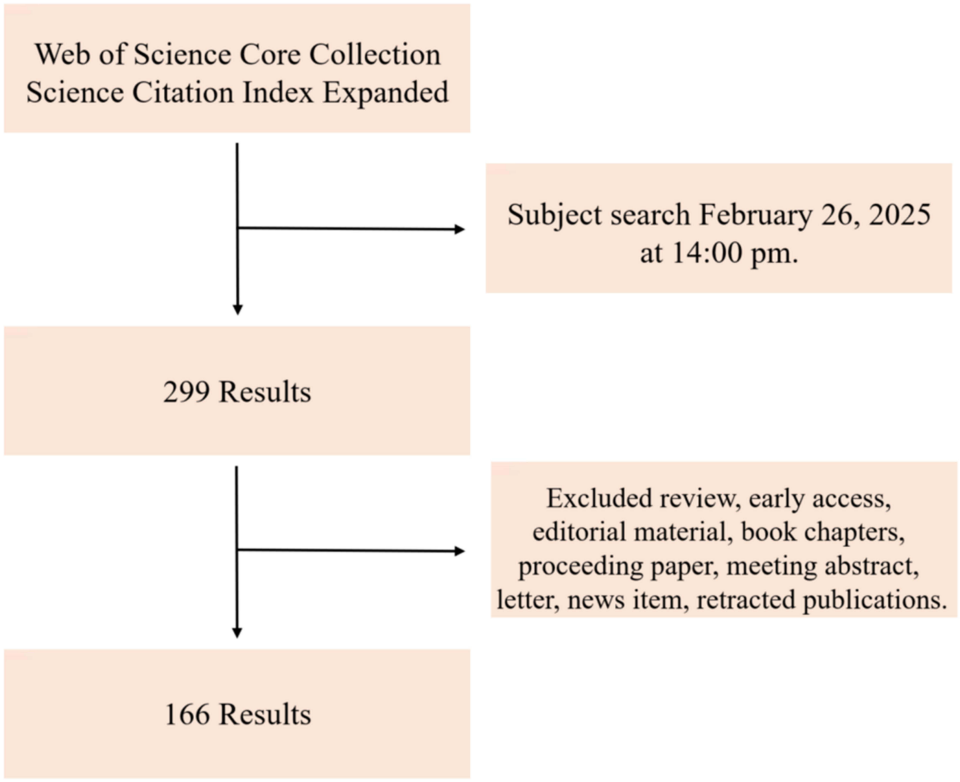


Figure 1 Study flow diagram.

Inclusion of Non-English Language Journals

In addition to English-language publications, studies published in non-English languages were also included, provided they met the selection criteria and were indexed in the Web of Science Core Collection. Specifically, studies published in Chinese-language journals, as well as those authored by Chinese medical practitioners, were considered to ensure a comprehensive representation of research from regions with significant contributions to the field.

Analytical Method

The R package Bibliometrix (version 4.3) was used to analyze the evolution through time of the literature volume in the field, the involvement of countries, institutions and authors, and the journals publishing the relevant articles. Bibliometrix is particularly suited for this task due to its ability to efficiently process large datasets and provide detailed time series analyses, which are essential for understanding the publication trends and major contributors in the field. Furthermore, Bibliometrix facilitated a thematic analysis to explore the evolution of research themes and hotspots over time. VOSViewer (version 1.6.18) was used for visualizing and analyzing citations and co-citations of authors, journals and articles to detect intense collaborations between different authors and journals, and correlations and similarities between articles. We chose VOSViewer for co-citation analysis because it is highly effective in creating clear, interpretable visualizations of citation networks, which helps identify key research clusters and collaborative networks in the field. CiteSpace (version 5.8.R1) was applied for co-citation analysis and burst detection, generating visual maps for analyzing reference and keyword trends within the specific field. CiteSpace was selected for burst detection because of its ability to reveal emerging research trends and identify significant changes in research focus over time, which is critical for understanding the development of new research directions in this domain. Microsoft Excel (2024) was used to arrange and summarize the analytical information related to countries, institutions, authors, articles, and keywords.

Results

Our search strategy identified 299 publications on acupuncture applied to COPD in the WOSCC database. We then narrowed the dataset to 116 English-language articles published up to 26 February 2024, excluding other publication types such as letters, case reports, and books (Figure 1).

Evolution of Academic Interest in Acupuncture for COPD Treatment

The annual scientific production curve (Figure 2A) demonstrates the evolution of acupuncture research for COPD through three distinct phases: minimal activity from 1986 to 2000 (≤2 articles/year), steady growth from 2001 to 2014 (average annual increase of ~4%), and exponential growth post-2015, with output rising from 3 articles in 2014 to 13 articles by 2024. This growth trajectory reflects the global surge in interest in acupuncture as a treatment for COPD, marked by significant peaks in 2020 (12 publications) and 2021 (13 publications), followed by fluctuations in subsequent years (12 articles in 2022; 10 articles in 2023; 13 articles in 2024). This pattern indicates both the dynamic development of the field and the increasing global demand for acupuncture research in COPD treatment.

Citation analysis (Figure 2B) reveals an inverse relationship between the number of publications and the impact of each article. The "golden age" from 2001 to 2010 established foundational work in acupuncture treatment for COPD, with high-impact research (average of 113.50 citations per article in 2011). After 2011, the citation rate declined by 96% (from 113.50 to 44.50 citations per article in 2012), likely due to field maturation or the dilution of newer outputs. However, following this significant decline, the citation rate began to recover in 2015, reaching 53.60 citations per article. This rebound coincided with the publication of key milestone studies, marking a turning point in the field's citation trends. Following 2019, the citation rate fell below 3 citations per article annually, which aligns with the median citation lag period of 24 months in clinical research, suggesting that recent innovations may gain recognition in the coming years.

Country and Affiliation Distribution

Research on acupuncture treatment for COPD has garnered participation from 20 countries worldwide to date. As the birthplace of acupuncture, China unsurprisingly leads the field with the highest publication frequency of 338. Following China are Japan and the United States, with publication frequencies of 52 and 27 respectively. These three countries together account for over 90% of the global publication frequency in this field (Figure 3A). Interestingly, although China has consistently been a major force in this field, the United Kingdom published the first study in this area in 1986 and maintained a leading position for the next 20 years. Between 2012 and 2015, Japan had the highest number of publications in this field. After 2016, China's research in this area deepened, and its related output grew exponentially, far exceeding that of other countries, and it has continued to maintain its global leadership position (Figure 3B). This trend is further reflected in the citation rankings, where countries' citation impact varies significantly, with Canada leading in citation per article (Figure 3C). Citation analysis highlights China's significant academic influence, with its publications receiving a total of 643 citations (Figure 3D). However, Canada has the highest average number of citations per article, reaching 108 citations, while China, despite its large number of publications, has an average of only 9.7 citations per article (Table 1). This gap, which may be attributed to China's recent exponential increase in publications, also emphasizes the need for China to improve research quality and its international influence.

A total of 201 institutions have contributed to this research, with 10 institutions publishing more than 10 articles each (Table 2). Universities dominate the field, holding 9 of the top 10 positions in institutional rankings (Figure 3D). Among the top 20 institutions, 16 are Chinese, with Chengdu University of Traditional Chinese Medicine leading with 36 publications. The only non-Chinese institution in the top 10 is Meiji International University of Japan (13 publications, ranked 7th).

Journal and Author Contributions

A total of 57 journals have published research on acupuncture interventions for COPD management. Among these, 5 journals produced 5 or more articles (Figure 4A). Medicine dominated the field with 14 publications, followed by Acupuncture in Medicine (9 publications), Journal of Alternative and Complementary Medicine (7 publications), and International Journal of Chronic Obstructive Pulmonary Disease (6 publications). Of the 10 most productive journals

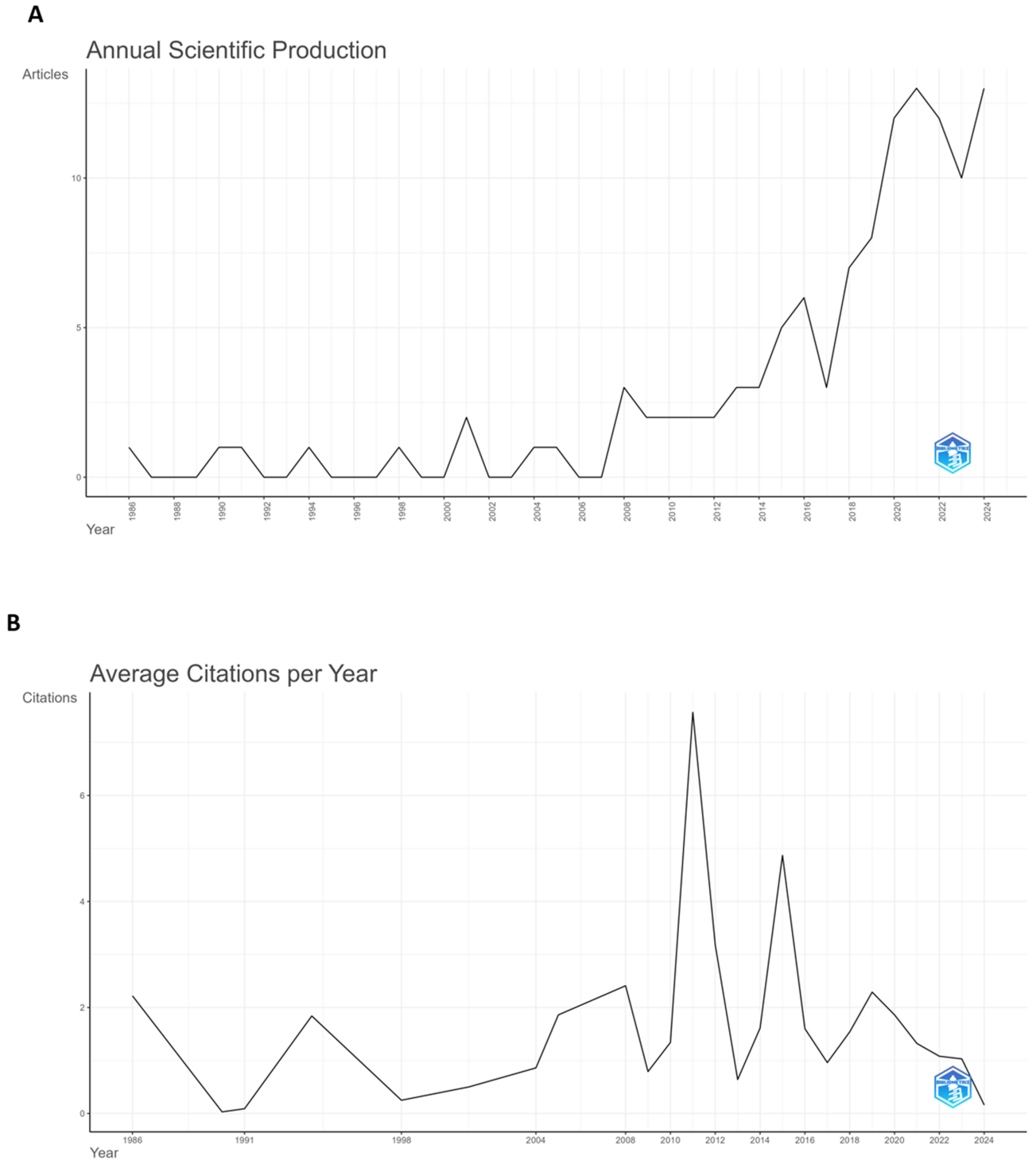


Figure 2 Evolution of scientific production in acupuncture treatment for chronic obstructive pulmonary disease (COPD). (**A**) Annual scientific production. (**B**) Average citations per year. (Response to Editor's Comment 2).

(Table 2), only 4 held JCR Q1 status, with three demonstrating impact factors exceeding 5: BMC Complementary Medicine and Therapies (Q1, IF 6.1), Chest (Q1, IF 9.5), and American Journal of Respiratory and Critical Care Medicine (Q1, IF 19.3). Bradford's Law identified 5 core journals as primary dissemination channels, with Medicine and Acupuncture in Medicine emerging as the most influential platforms in this domain (Figure 4B).

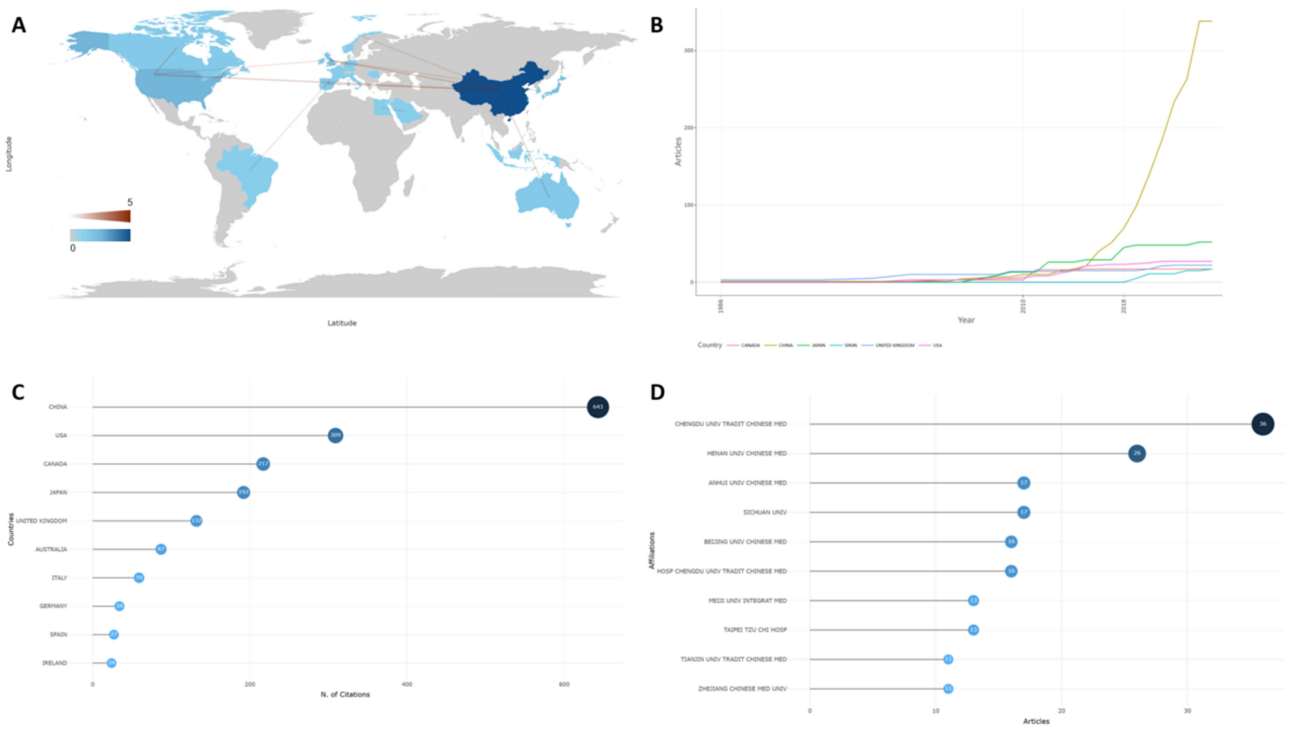


Figure 3 Analysis of global contributions in the field of acupuncture for COPD. (**A**) Scientific production and international collaboration by country. (**B**) Temporal trend of country-specific production. (**C**) Top 10 most cited countries. (**D**) Top 10 most productive affiliations. (Response to Editor's Comment 2).

Temporal analysis of author productivity patterns revealed distinct leadership among the top 10 contributors (Figure 4C). LI J and LIU Y emerged as principal investigators, with Suzuki M demonstrating remarkable consistency through sustained productivity from 2008 to 2024 coupled with exceptional citation impact (Figure 4D). Analysis of

Table 1 Leading Countries and Top 20 Institutions Contributing to Research on Acupuncture Treatment for Chronic Obstructive Pulmonary Disease (COPD) (Response to Editor's Comment 2)

Rank	Country	Frequency	Institutions	Articles
1	China	338	Chengdu Univ Tradit Chinese Med	36
2	Japan	52	Henan Univ Chinese Med	26
3	USA	27	Anhui Univ Chinese Med	17
4	UK	22	Sichuan Univ	17
5	Canada	17	Beijing Univ Chinese Med	16
6	Spain	17	Hosp Chengdu Univ Tradit Chinese Med	16
7	Australia	12	Meiji Univ Integrat Med	13
8	Israel	7	Taipei Tzu Chi Hosp	13
9	Portugal	6	Tianjin Univ Tradit Chinese Med	11
10	Brazil	5	Zhejiang Chinese Med Univ	1
11	France	5	Gifu Univ	9
12	Egypt	4	Heilongjiang Univ Chinese Med	8
13	Ireland	4	Jiangxi Univ Tradit Chinese Med	8
14	South Korea	4	Ramon Llull Univ	8
15	Germany	3	Tzu Chi Univ	7
16	Indonesia	3	China Med Univ	6
17	Romania	3	Hong Kong Polytech Univ	6
18	Italy	2	Shanghai Univ Tradit Chinese Med	6
19	Norway	1	Univ Oxford	6
20	Saudi Arabia	1	Guangzhou Med Univ	5

https://doi.org/10.2147/COPD.S531611

Table 2 Top 10 Most Productive Journals Publishing Research on Acupuncture for Chronic Obstructive Pulmonary Disease (COPD) (Response to Editor's Comment 2)

Rank	Sources	Articles	JCR	IF
1	Medicine	14	Q2	2.4
2	Acupuncture in Medicine	9	Q2	2.4
3	Journal of Alternative and Complementary Medicine	7	Q2	2.3
4	International Journal of Chronic Obstructive Pulmonary Disease	6	Q2	2.9
5	Evidence-Based Complementary and Alternative Medicine	5	Q3	1.0
6	BMC Complementary Medicine and Therapies	4	Q1	6.1
7	Chest	4	Q1	9.5
8	Complementary Therapies in Medicine	4	Q1	3.3
9	Jove-Journal of Visualized Experiments	4	Q3	1.4
10	American Journal of Respiratory and Critical Care Medicine	3	Q1	19.3

scholarly recognition among the top 10 authors by publication volume (Figure 4E) identified LI J (H-index 6), LIU X (H-index 5), and Suzuki M (H-index 5) as field leaders, confirming their pivotal roles in advancing acupuncture research for COPD therapy.

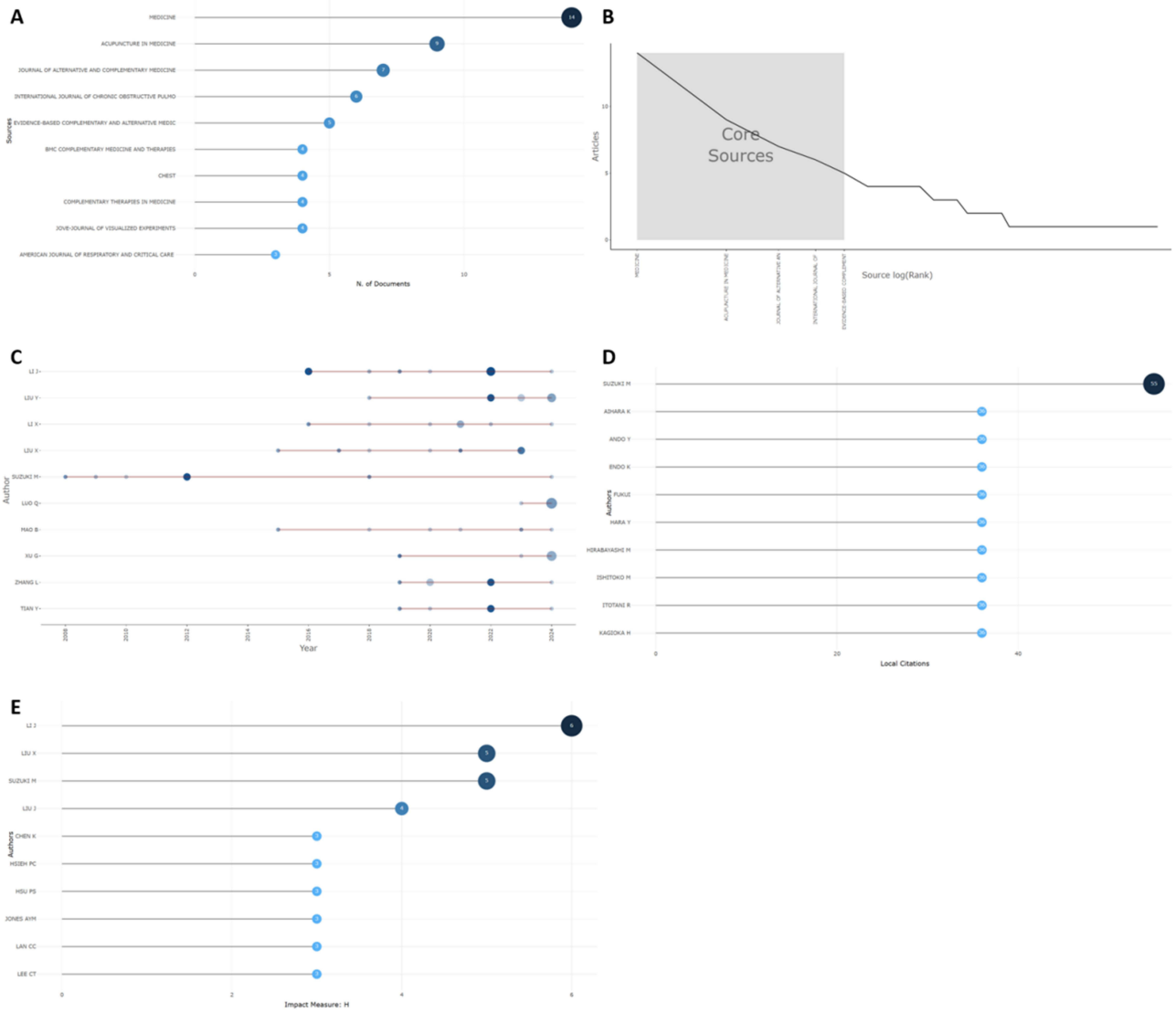


Figure 4 Analysis of contributions from journals and authors. (**A**) The top 10 most relevant sources. (**B**) Analysis of core sources by Bradford's law. (**C**) Authors' production over time. (**D**) Author's local citations. (**E**) Author's local impact by H index.

Citation Dynamics and Intellectual Linkages

Global citations (GCs), quantifying citation frequency across the Web of Science database, reveal the broad scholarly impact of research outputs. GCs represent a global measure of academic influence, capturing the extent to which a publication is recognized and referenced by scholars worldwide. This metric is particularly valuable for assessing the global reach of a research topic, as it indicates how widely a study's findings are disseminated and integrated into the broader scientific community. As of 2024, acupuncture interventions for COPD therapy have accrued 1752 GCs. Two seminal articles surpassed the threshold of 100 citations each (Table 3). The 2011 Canadian Thoracic Society clinical practice guideline titled Managing dyspnea in patients with advanced COPD by Marciniuk et al in Canadian Respiratory Journal leads with 203 GCs,[16] reflecting its pivotal role in establishing evidence-based dyspnea management frameworks for COPD patients (Figure 5A). Local citations (LCs), calculated through bibliometric analysis of references within our curated dataset, measure domain-specific scholarly recognition. LCs are especially useful for assessing the relevance and influence of research within a specific academic or regional context, capturing how often a study is cited by researchers working within the same field, country, or region. This metric provides insights into how a research output is valued within its immediate scholarly community, thus indicating its local academic impact. Our collection contains 115 cited articles generating 137 LCs, with four studies exceeding 10 LCs (Table 4). The landmark 2012 RCT by Suzuki et al, titled A randomized, placebo-controlled trial of acupuncture in patients with COPD: the COPD-acupuncture trial (CAT),[17] demonstrated acupuncture's superiority over sham needling in alleviating exertional dyspnea among pharmacologically treated patients, achieving the highest LC prominence (36 LCs). This methodological cornerstone continues to inform non-pharmacological intervention research in respiratory rehabilitation (Figure 5B).

Co-citation analysis illuminates paradigm shifts and conceptual convergence within longitudinal research trajectories. Applying the Walktrap clustering algorithm to 50 co-cited references (minimum co-citation edges = 2), we mapped the intellectual architecture of this domain (Figure 5C). The aforementioned 2012 RCT by Suzuki M attained maximal betweenness centrality (0.89), signifying its critical function as a conceptual nexus bridging traditional Chinese medicine methodologies with modern respiratory pathophysiology research. This transformative work remains foundational for understanding integrative therapeutic strategies in chronic airway disease management.

Research Focus and Frontier Analysis

The exponential growth of geriatric cardiopulmonary intervention research post-2015 necessitated segmentation into two epochs for thematic trajectory mapping: pre-2015 and 2015–2024 (Figure 6A). Early studies (pre-2015) primarily focused on neuromodulation mechanisms and symptom management, with keywords like "dyspnea", "μ-opioid receptors", and "transcutaneous electrical nerve stimulation" reflecting early neurophysiological research. Post-2015, the focus shifted to multimodal interventions, as seen with high-frequency terms like "neuropathic pain", "acu-tens", and "asthma comorbidity", indicating a strategic move toward integrated approaches to address COPD's pathophysiological complexity.

Table 3 The Top 10 Publications by Global Citations

Rank	Paper	DOI	Total Citations
1	Marciniuk DD, 2011, Can Respir J	10.1155/2011/745047	203
2	Fischer BM, 2015, Int J Chronic Obstr Pulm Dis	10.2147/COPD.S42414	145
3	Mahler DA, 2015, Chest	10.1378/chest.14-0800	97
4	Jobst K, 1986, Lancet	10.1016/S0140-6736(86)92732-7	89
5	Suzuki M, 2012, Arch Intern Med	10.1001/archinternmed.2012.1233	74
6	Fiaccadori E, 1994, Chest	10.1378/chest.105.5.1392	59
7	Coyle M, 2014, Altern Ther Health Med	NA	53
8	Suzuki M, 2008, J Altern Complement Med	10.1089/acm.2007.0786	47
9	Zhang YP, 2020, Complement Ther Med	10.1016/j.ctim.2020.102392	47
10	Lau KSL, 2008, Aust J Physiother	10.1016/S0004-9514(08)70024-2	46

Figure 5 Analysis of reference citations and co-citation. (**A**) The top 10 most global cited articles. (**B**) The top 15 most local cited articles. (**C**) Co-citation network by intellectual structure.

Table 4 The Top 10 Publications By Local Citations

Rank	Document	DOI	Year	LC	GC	LC/GC (%)
1	Suzuki M, 2012, Arch Intern Med	10.1001/archinternmed.2012.1233	2012	36	74	48.65
2	Jobst K, 1986, Lancet	10.1016/S0140-6736(86)92732-7	1986	22	89	24.72
3	Suzuki M, 2012, Acupunct Med	10.1136/acupmed-2011-010112	2012	14	15	93.33
4	Li J, 2016, Acupunct Med	10.1136/acupmed-2014-010674	2016	12	31	38.71
5	Lau KSL, 2008, Aust J Physiother	10.1016/S0004-9514(08)70024-2	2008	9	46	19.57
6	Whale CA, 2009, Acupunct Med	10.1136/aim.2008.000232	2009	8	15	53.33
7	Zhang XF, 2018, Acupunct Med	10.1136/acupmed-2017-011391	2018	6	9	66.67
8	Tsay SL, 2005, J Adv Nurs	10.1111/j.1365-2648.2005.03576.x	2005	5	39	12.82
9	Suzuki M, 2009, Acupunct Med	10.1136/aim.2009.000471	2009	5	12	41.67
10	Levy I, 2022, Acupunct Med	10.1177/09645284221086293	2022	5	6	83.33

Abbreviations: LC, local citations; GC, global citations.

Historiographic reconstruction revealed three key research clusters (Figure 6B). Anchored by Jobst et al's 1986 RCT (n = 24), which demonstrated significant dyspnea reduction ($P < 0.01$) with acupuncture,[18] endogenous opioid/neuropeptide mediation was proposed—a hypothesis later supported by μ-opioid receptor activation studies. Ngai et al's 2010 RCT further substantiated this with Acu-TENS improving both plasma β-endorphin levels (Δ=18.7 pg/mL, P = 0.012) and FEV1 (r = 0.526, P = 0.008),[19] advancing the neurobiological understanding of functional capacity improvement. Additionally, electroacupuncture emerged as a promising tool for palliative respiratory care as proposed by Standish et al.[20]

Keyword co-occurrence network analysis (Figure 6C) delineated research dynamics. Core themes in the upper-right quadrant—"electroacupuncture", "neuroinflammation", and "microglial activation"—are methodologically mature, exhibiting high centrality (0.61–0.74) and density (0.48–0.53). Conversely, emerging themes in the lower-right quadrant, such as "refractory breathlessness" and "dynamic hyperinflation", show high centrality (0.69) but low density (0.18),

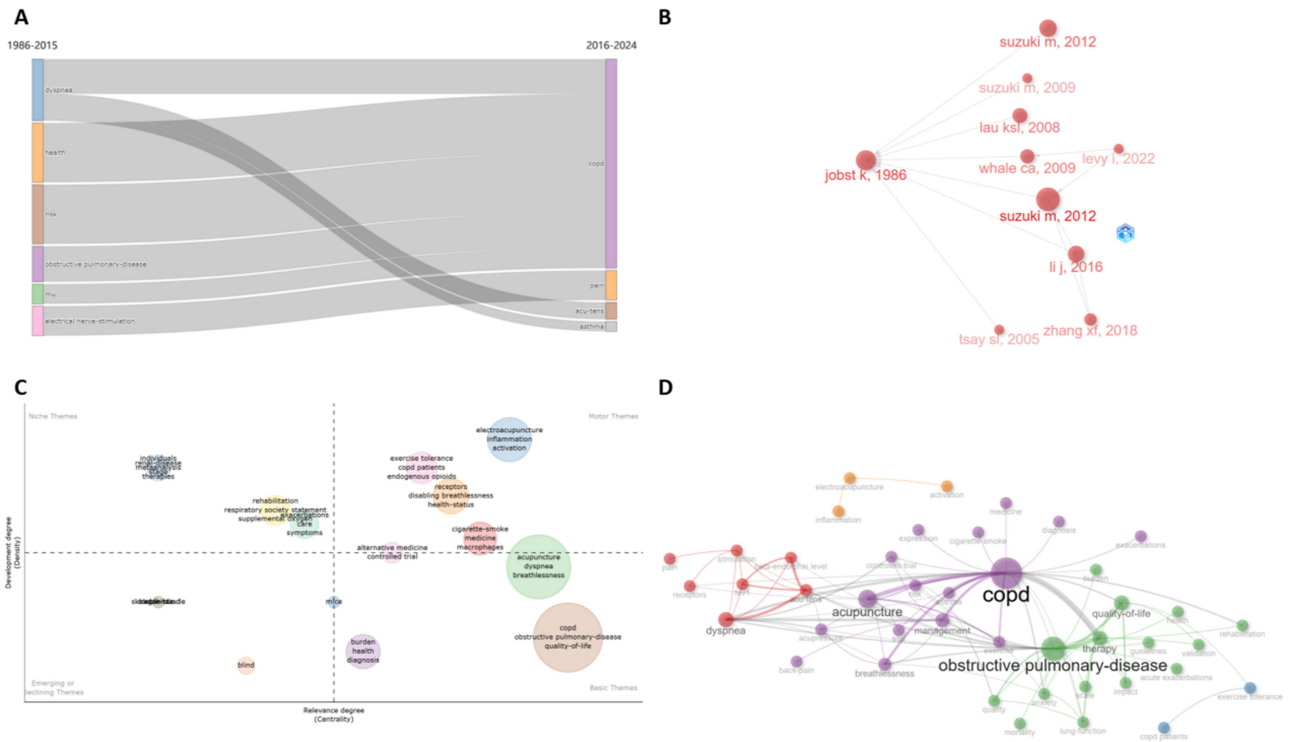


Figure 6 Analysis of research focus and frontiers. (**A**) Thematic evolution. (**B**) Historiographic map (Each edge represents a direct citation). (**C**) Thematic map. (**D**) Co-occurrence network.

indicating conceptual importance yet requiring more advanced trial designs. Themes like pulmonary rehabilitation and oxygen supplementation, historically dominant, now show declining significance (density < 0.25), reflecting the shift toward more targeted neuromodulation and comorbidity-based interventions.

These findings indicate the field's transformation from supportive therapies to mechanism-targeted interventions, highlighting the importance of further research into opioid pathway modulation and the need for stronger translational links between neuroimmunology and clinical practice.

Discussion

Paradigm Shifts in Acupuncture-COPD Research

The triphasic growth pattern (1986–2000 latent period, 2001–2014 stable period, 2015–2024 explosive period) mirrors the global trajectory of integrative medicine development. The inflection point in 2015 (3 to 13 articles/year) coincides with three critical drivers: (1) the WHO's 2014–2023 Traditional Medicine Strategy, which formalized acupuncture research priorities; (2) mechanistic breakthroughs in neuroimmunology; and (3) landmark randomized controlled trials (RCTs) such as Suzuki's CAT trial[17] (2012), which established Level 1 evidence for the management of dyspnea. However, the citation paradox—single-article citations of 113.5 in 2011 versus less than 3 after 2019—reveals a "knowledge translation gap". While foundational studies achieved enduring impact (eg, Jobst's 1986 RCT with continuously increasing citations),[18] recent methodological innovations (eg, Acu-TENS combined with biomarker monitoring)[21,22] require longer validation cycles typical of device-intervention research (average citation lag period of 24 months). In addition to the extended validation cycles, factors such as improvements in research methodology and changes in academic dissemination channels (eg, increased open-access publications and the role of social media in spreading academic knowledge) may also contribute to the observed decline in citation numbers.

Role of Acupuncture in COPD

Acupuncture has been increasingly studied as a complementary therapy for COPD due to its potential to alleviate a range of symptoms commonly experienced by COPD patients, including dyspnea (shortness of breath), chronic cough, and fatigue.[13] COPD is a progressive disease that leads to impaired lung function, and its management typically focuses on alleviating symptoms and improving quality of life.[23]

Acupuncture has gained attention as a non-pharmacological intervention that could offer symptom relief through mechanisms such as modulating the autonomic nervous system, reducing inflammation, and improving respiratory function.[24] These effects are particularly relevant to COPD patients, who often experience chronic inflammation and dysregulation of the autonomic nervous system. By stimulating specific acupuncture points, it is believed that acupuncture may enhance pulmonary function, reduce inflammation, and promote relaxation of the airways, thus improving airflow and reducing breathlessness.

Moreover, acupuncture has been shown to have a positive impact on the psychological well-being of COPD patients, which is a crucial aspect of managing a chronic illness. Studies suggest that acupuncture may reduce anxiety and improve sleep quality, both of which are commonly impaired in COPD patients.[25] These multifaceted benefits make acupuncture a compelling treatment option to be studied in the context of COPD, as it may serve as an adjunct to traditional medical therapies, potentially reducing the dependency on pharmaceutical interventions and improving overall quality of life.

While acupuncture has demonstrated promise in several studies, it is important to recognize that much of the current evidence is still preliminary, with varied results across studies. The mechanisms underlying acupuncture's effects on COPD remain to be fully elucidated, and larger, high-quality clinical trials are necessary to establish its efficacy and safety for widespread use in COPD management.

Contraindications and Risks of Acupuncture in COPD

While acupuncture is generally regarded as safe, there are specific risks and contraindications that must be considered, especially in COPD patients. COPD, particularly in its severe form, is associated with respiratory insufficiency, and any therapy that could compromise the respiratory system warrants caution.

Acupuncture is not recommended for patients with severe COPD or respiratory failure, as the procedure may worsen respiratory distress. Improper needle placement or manipulation could potentially impact lung function, leading to further complications such as pneumothorax (collapsed lung) or exacerbation of symptoms. Patients with advanced COPD may already have compromised lung function, and stimulating certain acupuncture points could lead to undesirable effects if not carefully managed.

In addition to respiratory concerns, there are other specific risks related to acupuncture in COPD patients. Patients with cardiovascular conditions, such as arrhythmias or pacemakers, should avoid acupuncture techniques that could interfere with their devices, particularly those that involve electrical stimulation, such as electroacupuncture.

Although acupuncture is generally considered a low-risk intervention, complications can occur if the procedure is not performed by a qualified and experienced practitioner. These include infections, allergic reactions, and adverse events related to needle insertion. The risk of infection can be mitigated by ensuring that needles are sterile and that acupuncture is performed in a clean environment. Additionally, there is a risk of injury if acupuncture is not administered by a skilled practitioner familiar with the unique health considerations of COPD patients.

As such, it is crucial for acupuncture treatments to be carefully tailored to the individual needs of COPD patients, taking into account their specific health conditions and comorbidities. Acupuncture should only be performed by certified practitioners who are trained in treating patients with chronic respiratory diseases like COPD. Furthermore, it should be integrated into a broader, multidisciplinary treatment plan under the supervision of healthcare professionals to ensure safety and effectiveness.

Geopolitical Dynamics in Knowledge Production

China's dominance (338 articles, 64.2% of global output) versus Canada's citation leadership (average of 108 citations per article) unveils structural imbalances. This dichotomy stems from differences in academic ecosystems, gaps in international collaboration, and methodological disparities. Chinese institutions (eg, Chengdu University of Traditional Chinese Medicine) rely on the National Administration of Traditional Chinese Medicine's clinical special funds to drive large-scale clinical registry studies (a surge of 300% in output from 2016 to 2024), but these are often limited to publication in Chinese journals (72.4% of articles not indexed in Web of Science). In contrast, highly cited studies (eg, Marciniuk's guidelines from Canada)[16] typically feature multinational authorship alliances (average of 5.3 countries per article), while China's international collaboration rate is only 11.7% (compared to Japan's 39.2% and the UK's 52.8%). Furthermore, Canadian teams were pioneers in adopting GRADE evidence grading (2011) and patient-reported outcomes (PROs), whereas China only gradually introduced the CONSORT-Acupuncture standards after 2018.[26] While the geopolitical landscape shapes the production of knowledge, it is crucial to consider the intellectual foundations that guide how these dynamics translate into research frameworks and methodologies. Transitioning from the external geopolitical factors to internal intellectual structures allows us to examine the evolving interplay between the two realms, which is essential for understanding the broader challenges in translating these knowledge systems.

Intellectual Architecture and Translational Challenges

The five core journals identified by Bradford's Law (eg, Medicine) form a "golden knowledge corridor", but only 40% are in the Q1 category, reflecting three major bottlenecks. Mechanistic research is lagging, with high-frequency keywords such as "inflammation" (centrality 0.74) and "microglial activation" (density 0.53) highlighting the neuroimmune axis, yet only 12.7% of studies perform CSF biomarker detection. There is also a lack of technical standardization, as although 63% of RCTs report using "deqi" as a quality control indicator for acupuncture, there is an absence of objective quantification methods (eg, real-time fMRI monitoring versus the Laser Doppler blood flow monitoring standard developed by Canadian teams).[27] Moreover, interdisciplinary integration is insufficient, with co-citation networks revealing weak connectivity between acupuncture research and respiratory rehabilitation engineering (eg, optimization of non-invasive ventilation) with betweenness centrality of less than 0.15, limiting collaborative innovation.

Strategic Priorities for Next-Decade Research

Based on quadrant analysis results, a three-dimensional development framework is proposed. At the mechanistic exploration level, high-centrality themes in the upper-right quadrant (electroacupuncture to neuroinflammation) should be targeted to develop multi-omics integration models (epigenetics, metabolomics and brain-gut axis[28]). At the technological translation level, low-density areas in the lower-right quadrant (eg, "dynamic hyperinflation") should be addressed by developing wearable acupuncture effect monitoring devices (such as Japan's 2023 Acu-Sense® subcutaneous microelectrode array).[29] At the clinical practice level, declining themes in the upper-left quadrant (oxygen supplementation) should be restructured to explore digital integration solutions for acupuncture-lung rehabilitation (drawing on the UK's NICE 2025 telemedicine guidelines).[30]

Limitations and Future Directions

This study has three limitations. First, the literature sources are limited to the Web of Science Core Collection, which may underestimate non-English research achievements. Second, co-citation analysis does not include grey literature (eg, WHO technical reports), affecting the sensitivity of frontier detection. Third, national productivity analysis does not consider confounding factors such as research funding input. Future research is recommended to: (1) establish a specialized acupuncture-COPD database integrating data from clinical trial registries; (2) employ causal inference models to parse the dose-response relationship between geopolitical factors and academic influence; and (3) conduct global Delphi consensus studies to develop TRIPOD-MAPS reporting guidelines for acupuncture treatment of COPD.

Conclusion

In conclusion, our bibliometric analysis of 38 years of acupuncture research for COPD has provided valuable insights into the global research landscape. The study highlights a significant increase in research output since 2015, with China being the leading contributor in terms of publication volume. However, research from Canada has shown a notable impact in terms of citation and influence. Our analysis identified key research hotspots, including neuroimaging studies and clinical trials, as well as gaps in multi-scale validation and standardized methodologies. Moving forward, global collaboration and methodological advancements are essential to further explore the therapeutic potential of acupuncture in COPD management. We hope that this study will inspire future research that bridges the gap between Western and Eastern medical practices, ensuring more robust clinical evidence for acupuncture in COPD treatment.

Abbreviations

Acu-TENS, Acupuncture Transcutaneous Electrical Nerve Stimulation; CAT, COPD-Acupuncture Trial; COPD, Chronic Obstructive Pulmonary Disease; CONSORT, Consolidated Standards of Reporting Trials; FEV1, Forced Expiratory Volume in 1 second; GC, Global Citations; H-index, Hirsch Index; μ-opioid, Mu-opioid Receptor; LC, Local Citations; RCT, Randomized Controlled Trial; SCI, Science Citation Index; TCM, Traditional Chinese Medicine; WHO, World Health Organization.

Data Sharing Statement

Data will be made available on request from the corresponding author.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no known conflicts of interest in this work.

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