

The Application of Acupuncture Therapy for Inflammatory Arthropathies Over the Past Decade: A Bibliometric Analysis

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Background: Acupuncture is widely recognized as a safe and effective therapy, with growing evidence supporting its efficacy in pain management, particularly for inflammatory arthropathies. However, no comprehensive bibliometric analysis exists in this specific field. This prompted our study to systematically map global research landscape and trends, advancing acupuncture application in inflammatory arthropathy management.

Methods: Data were retrieved from Web of Science, covering publications from January 1, 2015, to December 31, 2024. Bibliometric analyses, including descriptive statistics, co-occurrence, co-citation, and clustering, were conducted using CiteSpace for cited references and keywords, VOSviewer for journals, authors, references, countries, and institutions, Scimago Graphica for national collaboration networks, and Excel for annual publication trends.

Results: A total of 678 publications were included in this study. Annual publication output peaked in 2020, followed by a gradual decline in subsequent years. Chinese institutions and authors accounted for the highest publication volume, demonstrating absolute dominance in quantitative productivity. In contrast, U.S.-based institutions and researchers exhibit superior citation impact metrics, underscoring their preeminent role in shaping scientific influence within this field. *MEDICINE* emerged as the most prolific journal in terms of publication count, whereas *Arthritis Care & Research* exhibited the highest scholarly impact based on citation metrics. Keyword co-occurrence analysis revealed a predominant research focus on addressing clinical challenges and generating high-quality evidence through evidence-based medicine. However, a notable scarcity of mechanistic investigations into acupuncture's therapeutic effects on inflammatory arthropathies was observed.

Conclusion: This bibliometric study fills a critical knowledge gap by systematically mapping the global research landscape of acupuncture for inflammatory arthropathies, revealing China's quantitative dominance versus the U.S.'s qualitative leadership and a skewed focus on clinical validation over mechanistic exploration. These findings underscore the imperative for interdisciplinary collaboration to bridge evidence-practice gaps and elucidate acupuncture's biological underpinnings in inflammatory arthropathies.

Keywords: acupuncture, inflammatory arthropathies, pain, bibliometric analysis, citespace, VOSviewer

Introduction

Inflammatory arthropathies refers to a group of joint disorders where inflammatory reaction were inactivated, causing synovitis and synovial hyperplasia, encompassing over 40 related diseases.^{1,2} The representative types of inflammatory arthropathies include: degenerative arthropathies (osteoarthritis), autoimmune-related arthropathies (rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis), and crystal deposition disease (gout).³⁻⁹ Inflammatory arthropathies inflict severe and continual pain and consequent impaired life quality on affected patients.¹⁰⁻¹² In clinical practice, pharmacotherapy remains the primary treatment approach for inflammatory arthropathies. For instance, rheumatoid arthritis and ankylosing spondylitis are commonly managed with disease-modifying antirheumatic drugs (DMARDs), osteoarthritis is

typically treated with nonsteroidal anti-inflammatory drugs (NSAIDs), while gouty arthritis primarily involves colchicine and urate-lowering agents.^{13–16}

Pain, as the predominant symptom requiring prompt therapeutic intervention in inflammatory arthropathies, significantly compromises patients' quality of life.^{17–19} NSAIDs are often employed to relieve pain related to inflammatory arthropathies, but its long-term use may trigger a sequence of adverse reactions such as digestive tract ulcers.^{20–22} Despite their potent analgesic efficacy, opioids raise substantial clinical concerns due to their inherent addictive potential.^{23,24} While intra-articular glucocorticoid injections effectively achieve rapid pain relief through their potent anti-inflammatory properties, their clinical utility is restricted by the risks of cartilage damage and procedure-related infections associated with the invasive nature of the administration.^{25–27} In this setting, patients are eagerly seeking for approaches to relieve pain without apparent or latent side effects. Acupuncture has gradually come into sight of those patients and believed to be a safe and effective modality when performed properly by trained practitioners across the world.^{28–30} The mechanisms underlying acupuncture for treating inflammatory arthropathies are complex. Beyond potential neurophysiological and anti-inflammatory pathways,³¹ the efficacy of acupuncture may be partly attributed to its nonspecific effects.^{32–35} Bibliometric analysis offers unique advantages in mapping interdisciplinary research landscapes by quantitatively evaluating publication trends, identifying knowledge gaps, and visualizing collaborative networks.^{36–38} Despite growing interest in acupuncture for inflammatory arthropathies, no comprehensive bibliometric study has systematically synthesized evidence or delineated global research trajectories in this field. This gap impedes strategic prioritization of future studies and obscures translational pathways between preclinical findings and clinical applications. To address this critical need, our study employs bibliometric methodologies to characterize temporal and geographical publication patterns, identify high-impact contributors and institutional collaborations, analyze keyword co-occurrence for pinpointing research hotspots, and assess citation networks to evaluate evidence maturity. By integrating these multi-dimensional metrics, the analysis aims to inform evidence-based research agendas and optimize resource allocation for advancing acupuncture in inflammatory arthropathy management.

Materials and Methods

Data Collection and Search Strategy

Data were retrieved from the Web of Science (WoS) Core Collection database on April 3, 2025, covering publications from January 1, 2015, to December 31, 2024. Inclusion criteria were restricted to original articles and reviews published in English. The search strategy, including specific query syntax and post-processing steps, is systematically summarized in Table 1.

Analytical Tools

The analysis of research data was systematically conducted using multiple bibliometric tools. CiteSpace was applied to analyze references and keywords by importing TXT-format data downloaded from WOS. The data underwent deduplication and preprocessing, followed by parameter configuration: time slicing from January 2015 to December 2024 (with one-year

Table 1 The Topic Search Query

| Set | Results | Search Query |
|-----|---------|--|
| #1 | 15035 | TS = ("Acupuncture Therapy" OR "Acupuncture Treatment" OR "Acupuncture" OR "Manual Acupuncture" OR "Filiform Needle" OR "Intradermal Needling" OR "Imbedding Needle" OR "Needle-Knife" OR "Warm Acupuncture" OR "Internal Thermal Needles" OR "Acupoint Catgut Embedding" OR "Dry Needling" OR "Fire Needle" OR "Heated Needle" OR "Acupuncture Point Injection Therapy" OR "Wet Needling" OR "Ear Motional Acupuncture" OR "Acupressure") |
| #2 | 175026 | TS= ("Inflammatory Arthropathy" OR "Inflammatory Arthropathies" OR "Rheumatoid Arthritis" OR "Spondylarthritis" OR "Ankylosing Spondylitis" OR "Psoriatic Arthritis" OR "Reactive Arthritis" OR "Enteropathic Arthritis" OR "Undifferentiated Spondylarthritis" OR "Crystal Deposition Disease" OR "Gout" OR "Calcium Pyrophosphate Deposition Disease" OR "Polymyalgia Rheumatica" OR "Osteoarthritis") |
| #3 | 755 | #1 AND #2 |

Notes: Quoted phrases not found in phrase index: "Imbedding Needle", "Internal Thermal Needles", "Acupuncture Point Injection Therapy", "Ear Motional Acupuncture".

intervals), selection criteria using a proportional parameter $K=5$, and network pruning through the Pathfinder algorithm alongside sliced and merged network optimization. This process generated co-citation network maps, clustering networks, timeline diagrams, and burst detection maps for references, as well as co-occurrence network maps, clustering networks, timeline diagrams, and burst detection maps for keywords. In visualizations, node sizes corresponded to the frequency of item occurrences, while line thickness represented the strength of connections between nodes.

VOSviewer was used to analyze journals, authors, countries, and institutions. WOS data were converted into UTF-8 encoded TXT files and imported into the software to calculate publication counts, citation metrics, and collaborative relationships among these entities. The results were exported for further descriptive statistical analysis in Scimago Graphica and WPS Excel. Additionally, collaborative network maps were created to visualize interactions across journals, authors, countries, and institutions. For country-specific collaboration analysis, Scimago Graphica was utilized by importing GML-formatted collaboration tables derived from VOSviewer. Parameters were configured to label nodes as “Country” and cluster them using the “String” method, resulting in a structured country collaboration network. Finally, WPS Excel performed descriptive statistical analyses on all datasets, with outcomes visualized through ring charts, bar graphs, column charts, and similar graphical formats. This integrated approach ensured rigorous data interpretation and diverse visual representation of bibliometric patterns.

Results

Annual Number of Publications

This study identified a total of 678 peer-reviewed articles addressing acupuncture interventions for inflammatory arthropathies published during the ten-year period spanning from January 1, 2015, to December 31, 2024. Temporal analysis revealed a non-linear trend in annual publications (peak followed by decline), contrasting with a steady rise in citations (Figure 1A). Further country-level analysis indicated that China accounted for the highest publication volume (362 articles), nearly threefold higher than that of the United States (123 articles). However, articles from the United States received significantly more citations (7547 citations) compared to those from China (4224 citations) (Figure 1B). The proportional contributions of top-producing countries/regions were further mapped chronologically via an area chart (Figure 1C).

Patterns of International Collaboration in Published Studies

Based on collaborative relationships among countries and regions, clustering analysis was performed (Figure 2A), resulting in six distinct clusters. Cluster 1 comprised: Japan, the Netherlands, Norway, South Korea, and the United States. Cluster 2 included Brazil, France, Malaysia, Spain, and China Taiwan. Cluster 3 contained Egypt, India, and Sweden. Cluster 4 consisted of Australia, China, New Zealand, and Singapore. Cluster 5 was composed of Germany, Italy, Portugal, and Switzerland. Cluster 6 aggregated Canada, Iran, and the United Kingdom. The collaborative networks among these countries are illustrated in Figure 2B.

Inter-Institutional Collaboration and Research Impact

Through VOSviewer analysis, this section presents the institutional collaboration network and academic influence in acupuncture research for inflammatory arthropathies. The collaboration network reveals that Beijing University of Chinese Medicine (BUCM) demonstrates outstanding performance in both collaborative activity and network centrality, with a total link strength of 86, placing it at the core of the global network. BUCM has established stable partnerships with other high-output domestic institutions, such as the China Academy of Chinese Medical Sciences and Chengdu University of Traditional Chinese Medicine, forming a high-density collaboration cluster centered on China. Kyung Hee University (South Korea), the University of Maryland (USA), and University Hospital Zurich (Switzerland) also form a distinct central hub within the collaboration network, indicating their role as a key collaborative cluster in this research domain (Figure 3A).

In terms of research productivity, BUCM ranks first with 60 publications over the past decade, followed by Chengdu University of Traditional Chinese Medicine (32), China Academy of Chinese Medical Sciences (30), Capital Medical University

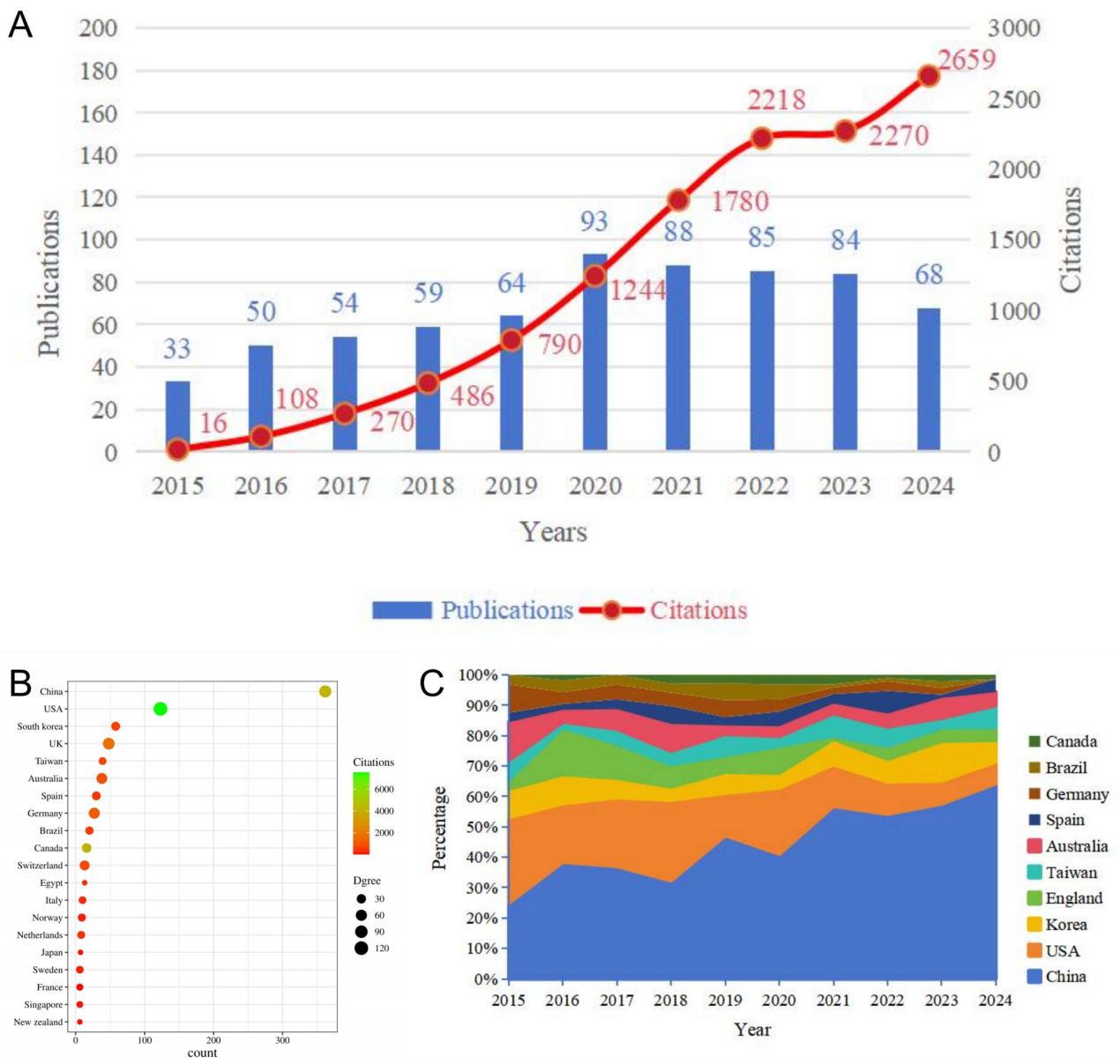


Figure 1 (A) Temporal dynamics of annual publications and citation counts in acupuncture for inflammatory joint diseases (2014–2023). (B) Country-specific publication outputs and citation metrics. (C) Annual proportional distribution of publication contributions by country/region.

(29), Guangzhou University of Chinese Medicine (28), and Kyung Hee University (28) (Figure 3B). These findings align closely with institutional impact indicators, further confirming these organizations’ pivotal roles in advancing research on acupuncture therapy for inflammatory arthropathies. Although the University of Maryland produced relatively fewer publications (14), it achieved an exceptionally high number of citations (4,463), indicating its high research quality and strong international recognition. In contrast, the relatively low average citation rate observed at BUCM suggests that despite its substantial research productivity in terms of publication volume, this output may not proportionally translate into commensurate scholarly impact, as evidenced by conventional citation metrics (Figure 3C).

Author Collaboration Networks and Scholarly Impact

A VOSviewer analysis was conducted to visualize co-authorship networks derived from publications on acupuncture for inflammatory arthropathies over the past decade (Figure 4A). The results identified several key contributors in terms of publication volume, citation frequency, and collaborative strength. Dr. Tu Jian-Feng emerged as a particularly active

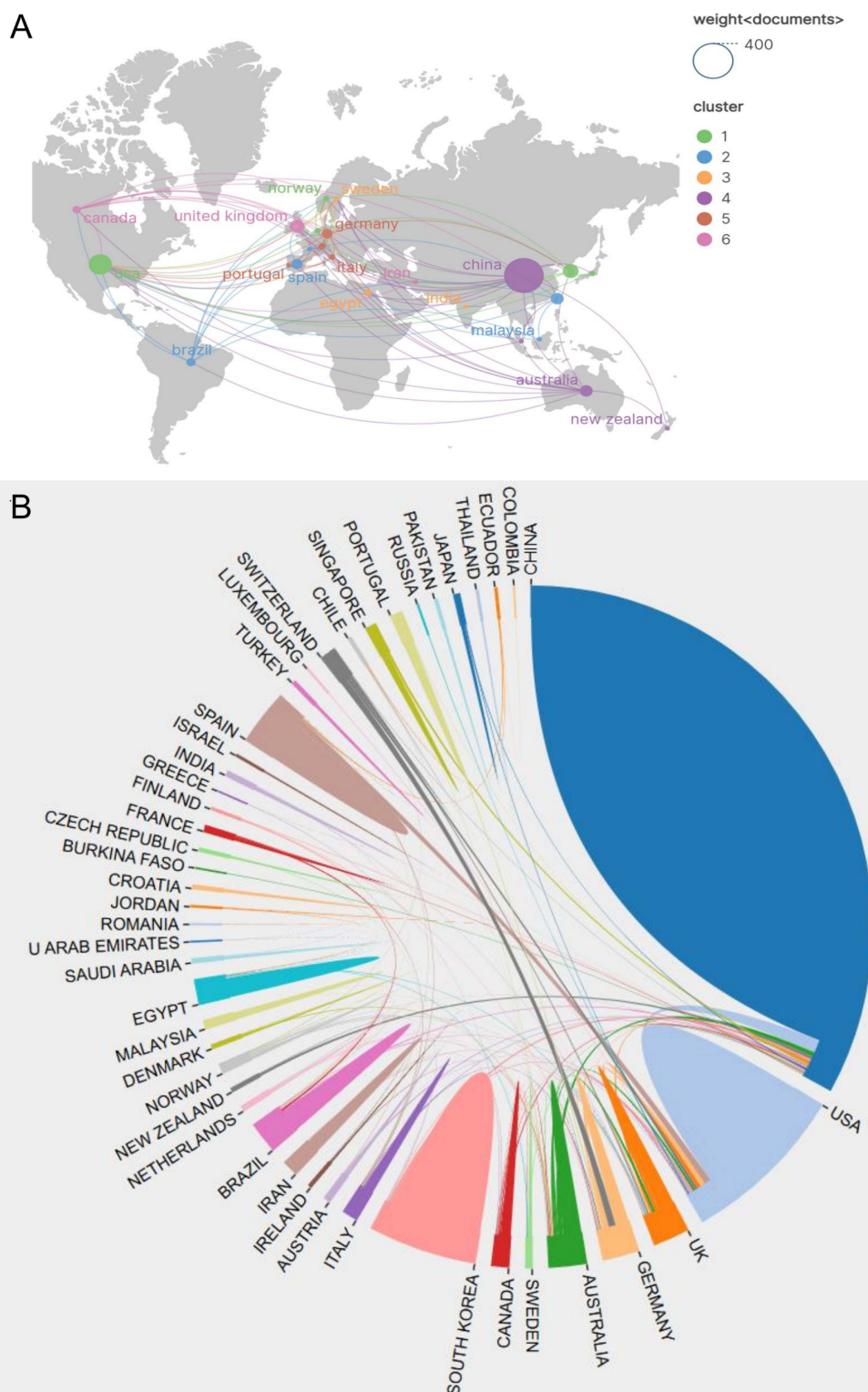
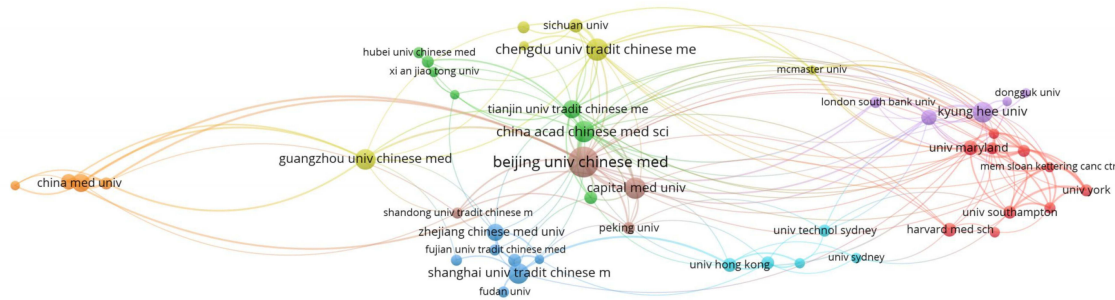


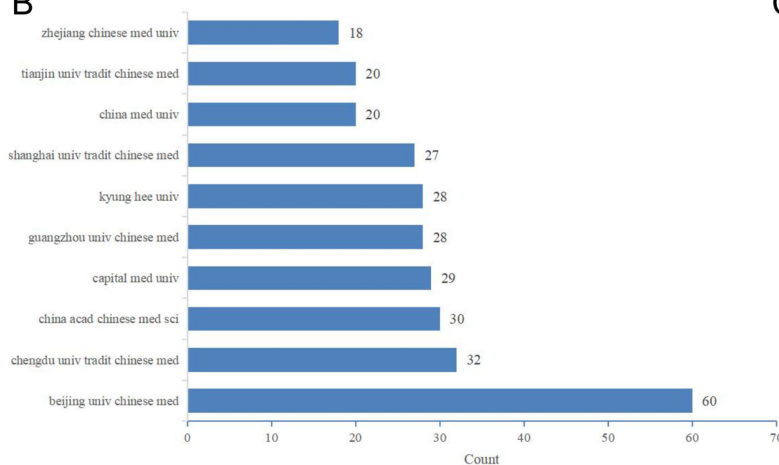
Figure 2 (A) Clustering analysis of collaborative relationships among countries and regions. **(B)** Collaborative network among countries and regions.

author, with 20 publications and 332 citations, and a total link strength of 110, highlighting his central role in academic collaboration. Following closely is Prof. Liu Cun-zhi, with 19 publications, 377 citations, and a link strength of 104, demonstrating stable academic influence.

A



B



C

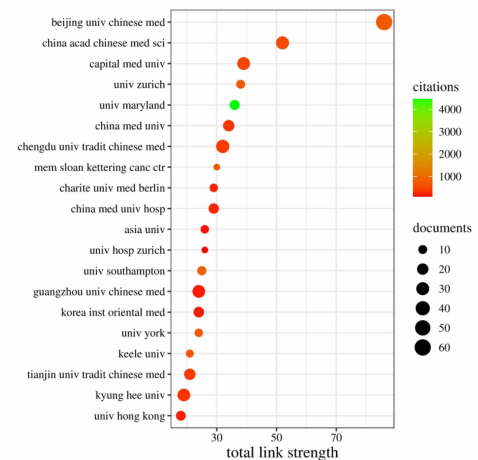


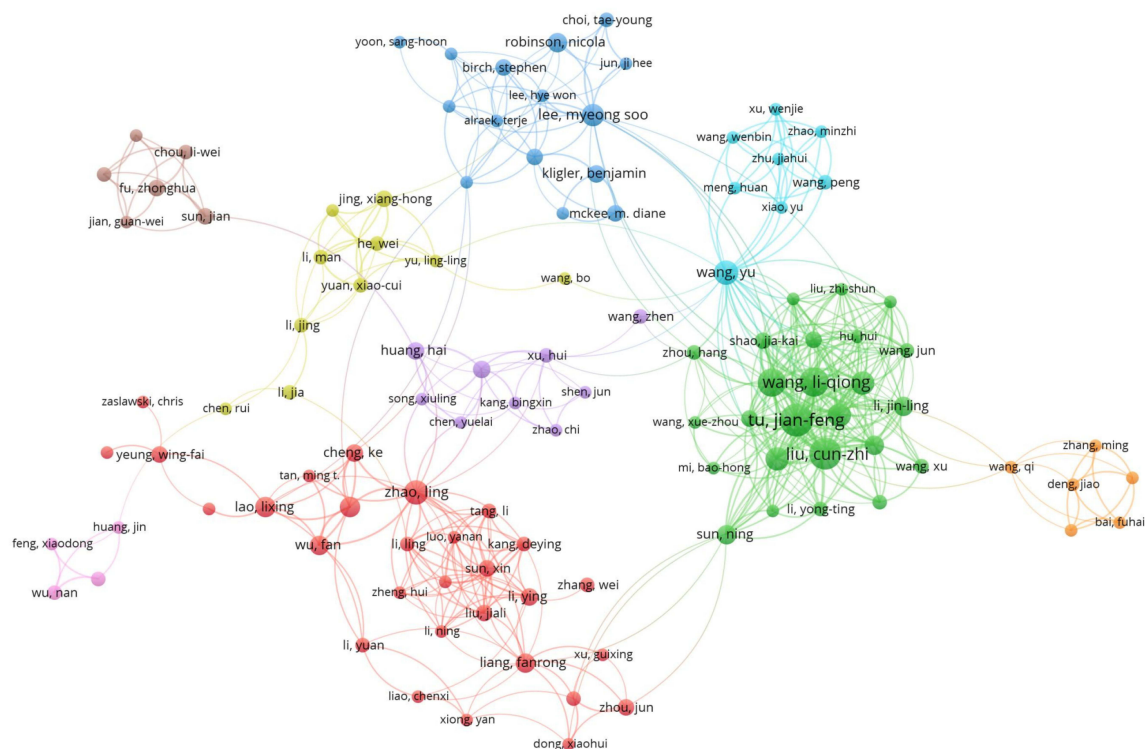
Figure 3 (A) VOSviewer visualization of inter-institutional collaborative networks. **(B)** Top 10 institutions by publication volume. **(C)** Bubble chart mapping institutional publication volume against citation count.

Other notable contributors include Dr. Wang Li-qiong (16 publications, 297 citations, link strength: 99) and Dr. Yang Jing-wen (15 publications, 355 citations, link strength: 95), both of whom have played important roles in advancing this field. In addition to these scholars, Prof. Claudia M. Witt has shown significant academic impact, with 9 publications and 571 citations, reflecting strong recognition in the academic community. Dr. Hugh MacPherson and Dr. George Lewith also stood out with high citation counts and active collaborative connections, further reinforcing their influence in the field (Figures 4B, 4C, and Table 2).

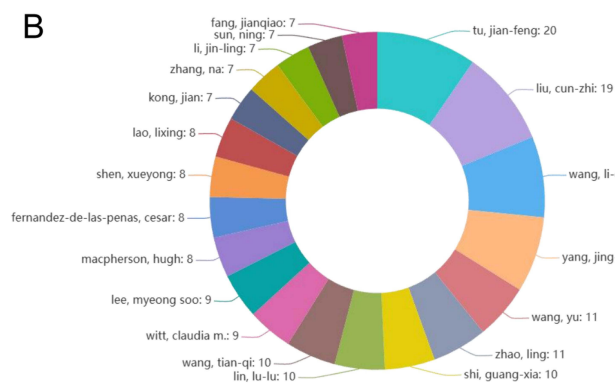
Analysis of Journal Publication and Citation Metrics

The included literature involved studies published across multiple journals, with the top 10 journals by publication volume listed in Table 3. The journals with the highest publication counts were *Medicine* (54 articles), *Evidence-Based Complementary and Alternative Medicine* (39 articles), and *Journal of Pain Research* (32 articles). Among the top 10 journals, only the *Journal of Traditional Chinese Medicine* originated from China, while the rest were predominantly European or American, indicating the field's continued reliance on international publication platforms. In terms of citation frequency, the most highly cited journals were *Arthritis Care & Research* (1920 citations), *Evidence-Based Complementary and Alternative Medicine* (588 citations), *The Journal of Pain* (572 citations), and *Osteoarthritis and Cartilage* (477 citations). Although *Osteoarthritis and Cartilage* ranked fourth by citation count, it had the highest Impact Factor (IF: 7.20) among the top journals, underscoring its academic authority in the area of joint and cartilage research. Additionally, analysis of average citations per article revealed that *Arthritis Care & Research* (384.0) and *The Journal of Pain* (95.3) had significantly higher citation densities, indicating their roles in disseminating high-impact

A



B



C

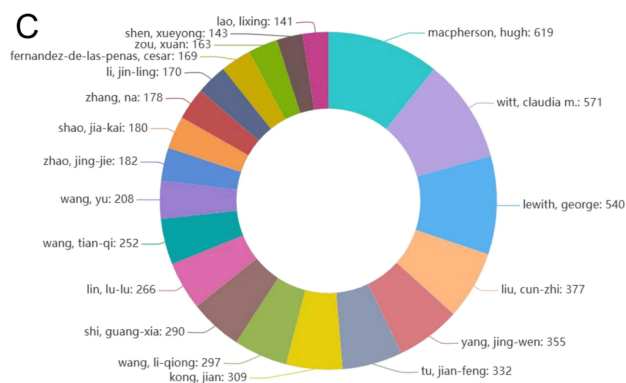


Figure 4 (A) VOSviewer visualization of co-authorship networks; (B) Publication count of authors; (C) Citation count of the author's publications.

research. A full overview of the citation performance—including total citations, number of publications, and average citations per article—is summarized in Table 4. To further identify core knowledge sources, a journal co-citation network was constructed using VOSviewer (Figure 5). The resulting visualization revealed several distinct clusters of journals, primarily grouped into general medicine, rheumatology, and traditional medicine domains. Core nodes such as *Arthritis Care & Research*, *Osteoarthritis and Cartilage*, *Medicine*, and *The Journal of Pain* occupied central positions in the network, highlighting their key influence in shaping the literature landscape of acupuncture therapy for inflammatory arthropathies.

Bibliometric Analysis of References

Highly cited references play a pivotal role in establishing the knowledge foundation of acupuncture therapy for inflammatory arthropathies. As shown in Table 5, the top 10 most-cited studies predominantly focus on large-scale

Table 2 Top 10 Authors with the Most Citations

| Rank | Author | Documents | Citations | Total Link Strength |
|------|------------------|-----------|-----------|---------------------|
| 1 | MacPherson, Hugh | 8 | 619 | 7 |
| 2 | Witt, Claudia M. | 9 | 571 | 6 |
| 3 | Lewith, George | 5 | 540 | 7 |
| 4 | Liu, Cun-Zhi | 19 | 377 | 104 |
| 5 | Yang, Jing-Wen | 15 | 355 | 95 |
| 6 | Tu, Jian-Feng | 20 | 332 | 110 |
| 7 | Kong, Jian | 7 | 309 | 0 |
| 8 | Wang, Li-Qiong | 16 | 297 | 99 |
| 9 | Shi, Guang-Xia | 10 | 290 | 63 |
| 10 | Lin, Lu-Lu | 10 | 266 | 76 |

Table 3 Top 10 Journals by Publication Volume

| Rank | Publication Title | Frequency | IF (2025) | Country |
|------|--|-----------|-----------|---------|
| 1 | <i>Medicine</i> | 54 | 1.4 | USA |
| 2 | <i>Evidence-Based Complementary and Alternative Medicine</i> | 39 | – | UK |
| 3 | <i>Journal of Pain Research</i> | 32 | 2.5 | UK |
| 4 | <i>Trials</i> | 26 | 2.9 | UK |
| 5 | <i>Acupuncture in Medicine</i> | 21 | 2.4 | UK |
| 6 | <i>Journal of Traditional Chinese Medicine</i> | 19 | 0.5 | CHN |
| 7 | <i>Journal of Alternative and Complementary Medicine</i> | 17 | 2.381 | USA |
| 8 | <i>PLOS ONE</i> | 16 | 2.9 | USA |
| 9 | <i>BMJ Open</i> | 16 | 2.9 | UK |
| 10 | <i>Complementary Therapies in Medicine</i> | 13 | 3.6 | UK |

Table 4 The Top 10 Journals with the Highest Citations

| Rank | Publication Title | Citations | Documents | Average Citations | IF (2025) |
|------|--|-----------|-----------|-------------------|-----------|
| 1 | <i>Arthritis Care & Research</i> | 1920 | 5 | 384.0 | 3.7 |
| 2 | <i>Evidence-Based Complementary and Alternative Medicine</i> | 588 | 39 | 15.1 | – |
| 3 | <i>The Journal of Pain</i> | 572 | 6 | 95.3 | 4.0 |
| 4 | <i>Osteoarthritis and Cartilage</i> | 477 | 9 | 53.0 | 7.2 |
| 5 | <i>Journal of Pain Research</i> | 450 | 32 | 14.1 | 2.5 |
| 6 | <i>The American Journal of Chinese Medicine</i> | 351 | 8 | 43.9 | 4.8 |
| 7 | <i>The Journal of Alternative and Complementary Medicine</i> | 297 | 17 | 17.5 | 2.4 |
| 8 | <i>Medicine</i> | 289 | 54 | 5.4 | 1.4 |
| 9 | <i>Acupuncture in Medicine</i> | 278 | 21 | 13.2 | 2.4 |
| 10 | <i>PLOS ONE</i> | 259 | 16 | 16.2 | 2.9 |

randomized controlled trials (RCTs) and meta-analyses, with particular emphasis on validating the efficacy of acupuncture in treating chronic pain and knee osteoarthritis. The 2005 *Lancet* study by Witt et al, with 87 citations, ranks first, followed by Hinman et al's 2014 *Journal of the American Medical Association* publication (83 citations) and Berman et al's 2004 *Annals of Internal Medicine* paper (80 citations), collectively highlighting the field's strong emphasis on evidence-based medical research.

Figure 6A presents a CiteSpace-generated co-citation network diagram, revealing dense interconnections among these highly cited references, indicative of their cross-disciplinary influence across multiple research themes. Notably, Vickers' 2018 study occupies a central position in the network, demonstrating its substantial methodological integration and broad impact on evidence-based practice. Figure 6B illustrates the citation frequency distribution, further confirming the

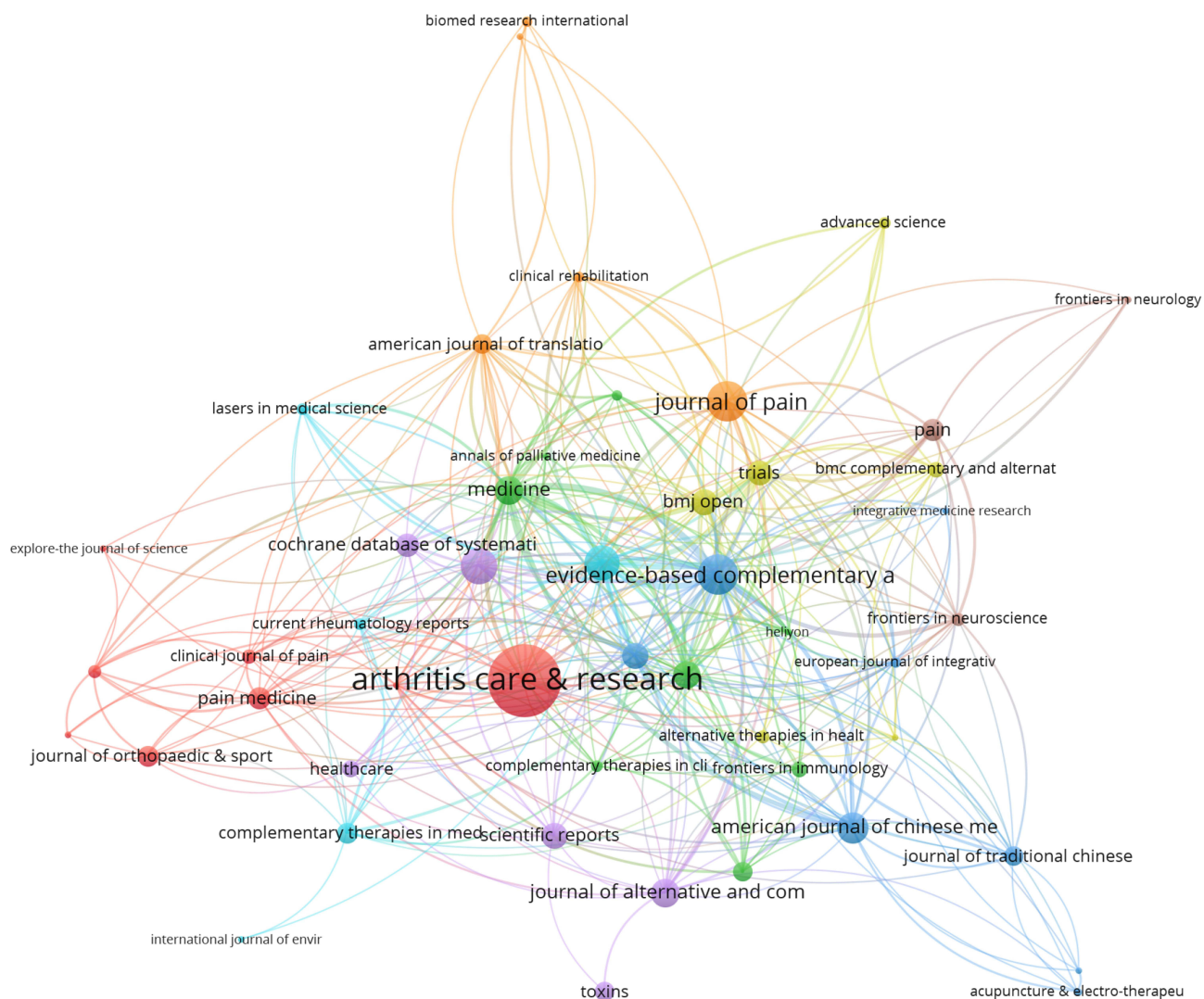


Figure 5 VOSviewer visualization of co-citation relationships among journals.

dominant status of systematic reviews and clinical trials in this domain. The diagram also annotates thematic cluster labels, with major groupings including “#0 pilot trial” “#1 rheumatology” “#3 protocols & guidelines” and “#4 knee joint.” These clusters reflect active research areas in clinical validation and guideline development, categorized into treatment approaches, intervention standards, mechanism exploration, and evaluation methodologies. The prominence of clusters such as “pilot trials” and “research protocols” underscores the field’s ongoing efforts to establish standardized therapeutic frameworks and optimize clinical practice guidelines.

Keywords and Chronological Trends

Clustering analysis of keywords identified 11 clusters, including alternative medicine, chronic pain, dry needling, knee osteoarthritis, rheumatoid arthritis, systematic review, meta-analysis, RCT, management, therapy, and network meta-analysis (Figure 7A). Temporal ranking of clusters revealed their keyword compositions: the alternative medicine cluster encompassed terms such as complementary, alternative medicine, acupuncture, mechanisms, recommendations, and expression; chronic pain included chronic pain, low back pain, and acupuncture therapy; dry needling comprised stimulation, knee, reliability, hip osteoarthritis, and dry needling; knee osteoarthritis featured model, electroacupuncture, osteoarthritis, and sham acupuncture; rheumatoid arthritis involved inflammation, rheumatoid arthritis, quality of life, and disease; systematic review covered pain, knee osteoarthritis, outcome, systematic review, manual acupuncture, and

Table 5 Top 10 Most Cited References in Acupuncture Research for Inflammatory Arthropathies

| Rank | First Author | Year | Article Title | Journal Title | Citations | IF (2025) |
|------|---------------------|------|---|---|-----------|-----------|
| 1 | Witt C | 2005 | Pragmatic randomized trial of acupuncture for chronic pain | <i>The Lancet</i> | 87 | 98.4 |
| 2 | Hinman RS | 2014 | Acupuncture for chronic knee pain: a randomized trial | <i>Journal of the American Medical Association (JAMA)</i> | 83 | 45.54 |
| 3 | Berman BM | 2004 | Effectiveness of acupuncture as adjunctive therapy in osteoarthritis of the knee: a randomized trial | <i>Annals of Internal Medicine</i> | 80 | 19.6 |
| 4 | Vickers AJ | 2012 | Acupuncture for chronic pain: individual patient data meta-analysis | <i>Archives of Internal Medicine</i> | 64 | 0.0 |
| 5 | Corbett MS | 2013 | Acupuncture and other physical treatments for the relief of pain due to osteoarthritis of the knee | <i>Osteoarthritis and Cartilage</i> | 59 | 7.2 |
| 6 | N Bellamy | 1988 | Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee | <i>The Journal of Rheumatology</i> | 57 | 3.6 |
| 7 | Marc C Hochberg | 2012 | American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee | <i>Arthritis Care & Research</i> | 57 | 3.7 |
| 8 | Hanns-Peter Scharf | 2006 | Acupuncture and knee osteoarthritis: a three-armed randomized trial | <i>Annals of Internal Medicine</i> | 57 | 19.6 |
| 9 | Sharon L Kolasinski | 2020 | 2019 American College of Rheumatology/Arthritis Foundation Guideline for the Management of Osteoarthritis of the Hand, Hip, and Knee | <i>Arthritis Care & Research</i> | 50 | 3.7 |
| 10 | Andrew J Vickers | 2018 | Acupuncture for Chronic Pain: Update of an Individual Patient Data Meta-Analysis | <i>The Journal of Pain</i> | 49 | 4.0 |

validation; meta-analysis incorporated exercise, adjunctive therapy, arthritis, and meta-analysis; RCT highlighted double-blind, efficacy, RCT, clinical trials, and ankylosing spondylitis; management included management, American College, and traditional Chinese medicine; therapy focused on therapy, prevalence, health, and impact; and network meta-analysis emphasized hip, burden, and network meta-analysis (Figure 7B). Chronological analysis of keyword emergence showed distinct annual trends: terms such as alternative medicine, stimulation, complementary, and double-blind emerged in 2015; RCT, adjunctive therapy, and safety in 2016; clinical trials in 2018; recommendations and health in 2019; systematic review in 2020; network meta-analysis in 2021; and dry needling, traditional Chinese medicine, reliability, hand, American College, and hip osteoarthritis in 2022 (Figure 7C).

Discussion

Over the past decade, the application of acupuncture in inflammatory arthropathies has evolved into a dynamic and interdisciplinary research field. This bibliometric analysis reveals significant trends, knowledge gaps, and emerging priorities that warrant critical discussion.

Growth Trajectory and Geographic Disparities

Over the past decade (2015–2024), a total of 678 articles on acupuncture therapy for inflammatory arthropathies have been published. In terms of publication growth trends, a steady increase was observed from 2015 to 2019, followed by a sharp surge in 2020 (a 45% increase compared to the previous year), which marked the peak. Subsequently, a gradual decline occurred from 2021 to 2024. We hypothesize that the COVID-19 pandemic, which began in December 2019, may have disrupted research activities and halted the upward trajectory of publication growth.^{39–42} Further analysis of annual publication output by country and regions revealed that China and the United States, as the top two contributors, accounted for over 71% of the total publications. To investigate the reasons for the declining trend

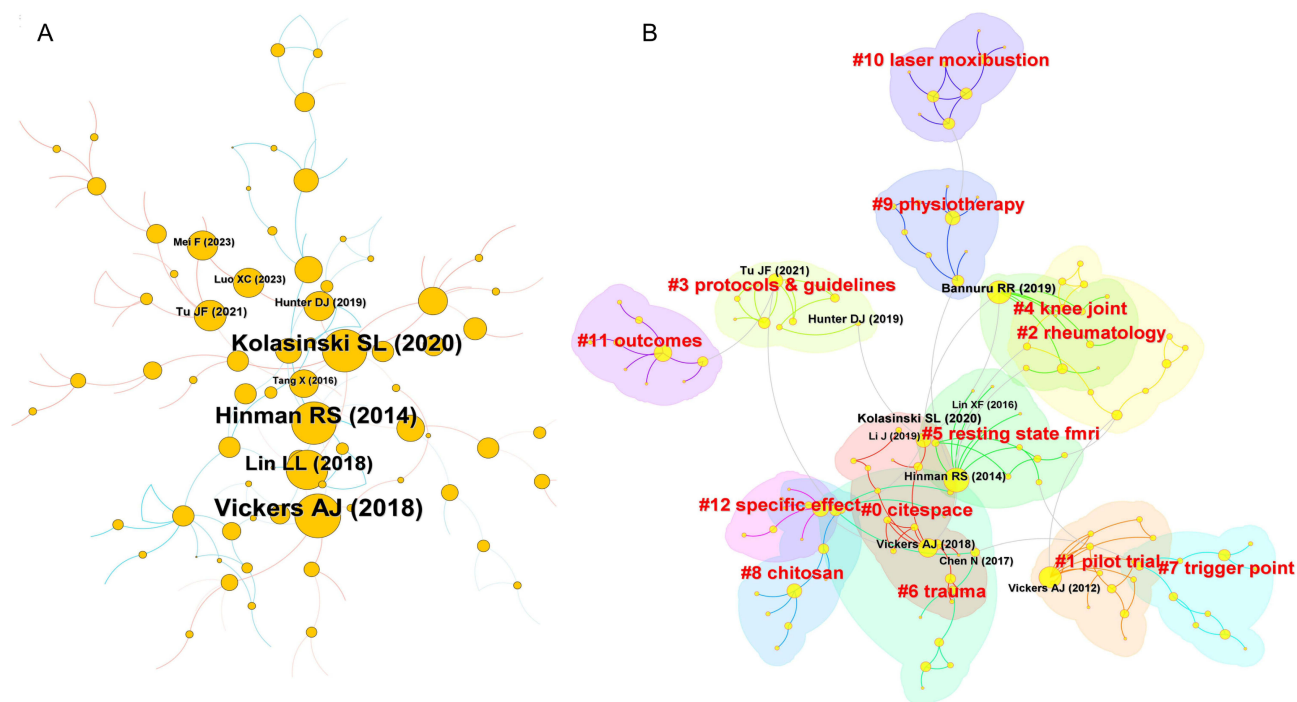


Figure 6 (A) Co-citation network of references visualized using CiteSpace; (B) Centrality and thematic clustering of highly cited references.

from 2021 to 2024, we examined country-specific patterns. Post-2020, China's annual publication output stabilized, while the United States and the United Kingdom experienced continuous declines in publication numbers. These trends in the latter two countries were identified as key drivers of the overall reduction in global research output during this period.

Further analysis of international collaborative relationships reveals that although China leads in the number of published papers, only a very small proportion of its research involves international collaboration. This pattern is similarly observed in other Asian countries, such as South Korea and Iran. In contrast, the proportion of internationally collaborative research in the United States, the United Kingdom, Germany, and Australia is significantly higher than in China, South Korea, and Iran. Notably, nearly all research outputs from Sweden involve collaboration with other countries. Thus, while Asian countries dominate in terms of publication volume, they exhibit a pronounced deficiency in international cooperation.

We guess that despite shared geographical proximity, China, South Korea, and Iran each possess distinct linguistic and cultural systems, which may create barriers to cross-border collaboration and communication. Additionally, this phenomenon is closely linked to policy-related challenges. For example, South Korea's National Research Foundation requires additional documentation, such as foreign funding certifications, for international collaborative project applications, complicating the approval process. Meanwhile, Iran faces difficulties in accessing databases like PubMed and WoS due to international sanctions, hindering literature synchronization and collaborative alignment. In contrast, European and American countries benefit from well-established transnational networks that mitigate such obstacles. To advance this field, Asian countries should prioritize initiatives such as establishing multinational, multicenter clinical trial networks and unifying standardized terminology systems for acupuncture in the treatment of inflammatory arthropathies. These measures could foster greater integration and progress in future research.

Structure and Bibliometric Impact of Scholarly Output

We analyzed the structure and impact of academic output in acupuncture research for inflammatory arthropathies through institutional collaborations, author contributions, journal distribution, and citation influence. Within the constructed institutional collaboration network, two core clusters were identified. The first cluster comprises Chinese research

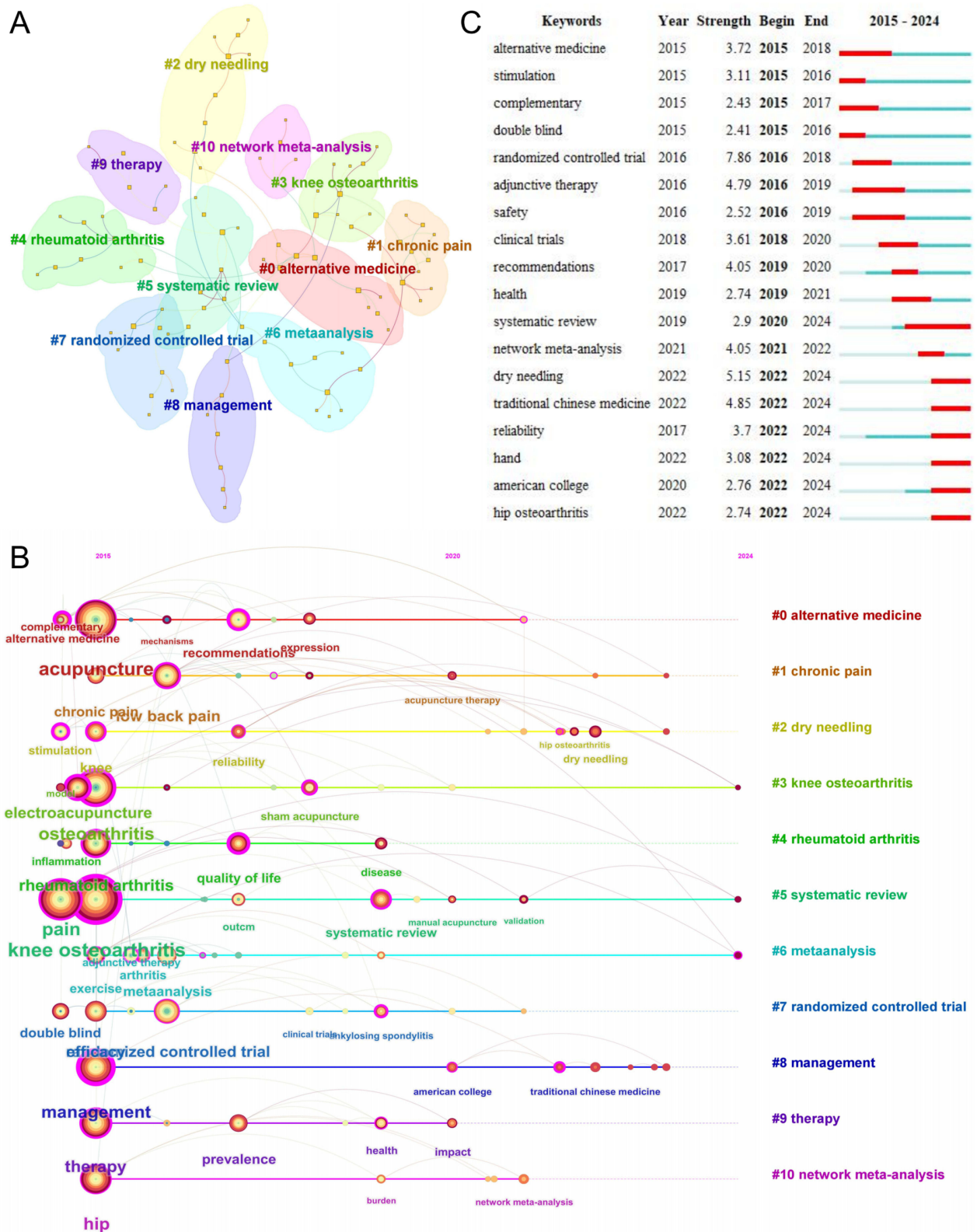


Figure 7 (A) Visualization of keyword clustering analysis. (B) Temporal ranking of keyword clusters. (C) Timeline of the emergence of the keywords with strongest citation burst.

institutions led by BUCM, while the second cluster includes Western institutions such as the University of Zurich, University of Maryland, University of York, University of Southampton, and Harvard Medical School, representing distinct Eastern and Western research hubs.

Further analysis ranking institutions by publication volume revealed that Chinese institutions occupied nine of the top 10 positions, with the remaining institution located in South Korea, demonstrating Eastern researchers' dominance in quantitative output. However, an evaluation of research impact—measured by citation count per publication—showed significantly lower citation rates for Chinese institutions. A similar pattern emerged in author-level analysis: Chinese researchers exhibited higher publication volumes but substantially fewer citations. We guess that this phenomenon may be closely related to China's research evaluation system, which prioritizes publication quantity over quality.

Journal Publications and Citation Metrics

Among the top 10 journals publishing research on acupuncture for inflammatory arthropathies, the list includes general medical journals (*Medicine*, *Trials*, *PLOS ONE*, and *BMJ Open*), complementary and alternative medicine related journals (*Evidence-Based Complementary and Alternative Medicine*, *Acupuncture in Medicine*, *Journal of Traditional Chinese Medicine*, *Journal of Alternative and Complementary Medicine*, *Complementary Therapies in Medicine*), and the pain-specialized journal *Journal of Pain Research*. Notably, only *Complementary Therapies in Medicine* has an impact factor exceeding 3, while *Evidence-Based Complementary and Complementary Medicine* is no longer indexed in the WOS. These data collectively indicate the limited overall academic impact of current literature on acupuncture for inflammatory arthropathies.

A striking observation is that *Arthritis Care & Research*, despite publishing only 5 articles on this topic, has garnered 1920 citations. Although its 2025 impact factor is modest (3.7), each acupuncture-related article received an average of 384 citations, highlighting this journal's pivotal role in advancing research on acupuncture for arthritis. Among the top-cited papers on acupuncture for inflammatory arthropathies, the top 10 predominantly include RCTs and meta-analyses evaluating acupuncture's efficacy, alongside expert consensus guidelines on therapeutic protocols. These studies have played a foundational role in shaping the evidence base and knowledge framework for acupuncture in managing inflammatory arthropathies.

Research Hotspots and Frontiers

Cluster analysis identified the most frequent keywords in acupuncture research for inflammatory arthropathies as: alternative medicine, chronic pain, dry needling, knee osteoarthritis, rheumatoid arthritis, meta-analysis, RCT, management, therapy, network meta-analysis. Among these, alternative medicine reflects the medical categorization of acupuncture, while dry needling denotes a common acupuncture technique. Chronic pain represents the most prevalent clinical manifestation across inflammatory arthropathies and a primary therapeutic target of acupuncture.

RCT emerged as a high-frequency keyword during 2016–2018, serving as a key methodology for validating acupuncture efficacy. Subsequent prominence of meta-analysis and systematic reviews indicates a shift toward synthesizing RCT evidence through statistical methods to obtain higher-level proof. From 2021 onward, network meta-analysis gained traction, establishing itself as a critical evidence-based medical tool in this field.

The recurring keywords management and therapy highlight the clinical problem-solving orientation of current research. Knee osteoarthritis and rheumatoid arthritis, the most prevalent inflammatory arthropathies associated with chronic pain, are recognized as priority conditions for acupuncture intervention. Timeline analysis revealed emerging interest in ankylosing spondylitis and low back pain, suggesting expanding applications of acupuncture.

Notably, existing studies predominantly focus on clinical outcomes and evidence synthesis, with limited exploration of acupuncture's mechanistic underpinnings. Future research should prioritize elucidating the neurobiological and molecular mechanisms underlying acupuncture's analgesic effects in inflammatory arthropathies, as these pathways remain incompletely characterized.

Limitations and Future Directions

This study has inherent limitations, including potential selection bias from English-database reliance and methodological constraints of bibliometric approaches, which may undervalue non-Anglophone contributions and clinical relevance. The COVID-19 pandemic's disruption further complicates trend interpretation. Future research should prioritize elucidating acupuncture's molecular mechanisms through multi-omics and neuroimaging, while fostering global collaboration via standardized terminology and multinational trial networks. Methodological innovation and equitable evaluation metrics balancing quantity and impact are urgently needed. Expanding database inclusivity to non-English literature will enhance representativeness, bridging Eastern traditional practices with Western evidence-based frameworks to advance integrative therapeutic strategies. To assess the effectiveness of acupuncture, future research must establish placebo control groups characterized by sound methodological features.⁴³

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Disclosure

The authors report no conflicts of interest in this work.

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