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ORIGINAL RESEARCH

# Research Trends of Acupuncture Therapy for Chronic Pain-Related Depression or Anxiety from 2003 to 2023: A Bibliometric Analysis

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**Background:** Chronic pain (CP) as a long-lasting stressor can often cause mood disorders, such as depression or anxiety. The comorbidity of CP and mood disorders poses challenges for treatment and increases healthcare costs. Acupuncture has emerged as a widely utilized approach to alleviate both CP and mood disorders. However, there is a lack of well-established bibliometric analyses in this area of research. Therefore, this study aimed to identify the current hotspots and research trends regarding the use of acupuncture for treating CP-related depression or anxiety.

**Methods:** We searched the Web of Science Core Collection spanning from 2003 to 2023 to identify relevant literature about the use of acupuncture for treating CP-related depression or anxiety. Bibliometric and visualization analyses were performed using CiteSpace 5.7.R5 and Vosviewer 1.6.19 software.

**Results:** A total of 254 articles published between 2003 and 2023 were included, revealing an upward trajectory with some fluctuations in publication numbers over the past two decades. China and the Beijing University of Chinese Medicine were the most productive country and institution in this field. Fang JQ and Vickers AJ ascended as the most prolific and influential authors, respectively. *Trials* was the journal with the highest number of publications, while *Pain* and *BMJ-British Medical Journal* exhibited the highest citation and centrality, respectively. "Acupuncture", "depression", and "chronic pain" were the top three keywords. The hotspots in this domain encompass types of chronic pain that predispose to negative mood, including fibromyalgia, irritable bowel syndrome (IBS), and neuropathic pain. Randomized controlled trials (RCTs), mechanisms, and evidence-based evaluations are the main research directions.

**Conclusion:** This study uses bibliometric techniques to analyze the research hotspots and forefronts of acupuncture as a therapeutic approach for CP-related depression or anxiety. Our objective is to provide researchers with valuable references and identify research focal points for future investigations.

**Keywords:** acupuncture, chronic pain, depression, anxiety, citespace, VOSviewer, bibliometric analysis

## Introduction

Chronic pain (CP) is a debilitating condition persisting or recurring for over 3 months,[1] and often co-occurs with mood disorders like depression and anxiety.[2] Brain imaging studies consistently show an association between altered brain functionality and the interplay between pain and mood in CP suffers.[3] There is a clear correlation between CP and comorbid depression or anxiety,[4] with rates ranging from 50% to 60%.[5] It is worth noting that the prevalence of these comorbidities varies based on the specific type of CP,[6] posing challenges in diagnosis and treatment, resulting in elevated annual healthcare costs.[7] Hitherto, pharmacotherapy is the primary approach to managing comorbid CP along with depression or anxiety. Regrettably, the effectiveness of these medications in addressing underlying CP is constrained, and they often come with significant adverse effects.[8] Therefore, innovative therapeutic interventions are needed to address CP while simultaneously alleviating the comorbid symptoms of depression or anxiety.

Traditional Chinese medicine (TCM) represents a distinct approach from Western medicine and has developed into a comprehensive and self-contained theoretical framework in China.[9] Acupuncture, as a renowned external treatment in TCM, has a rich history dating back to 2000 years ago. The therapeutic efficacy of acupuncture as a non-pharmacological approach to managing CP and emotional disorders has gained considerable recognition.[10,11] In contrast to pharmacological interventions, acupuncture not only ameliorates pain and associated emotional disturbances in individuals with CP but also presents negligible toxic side effects.[12] Consequently, acupuncture holds promise in significantly reducing healthcare expenditures.[13] In addition, several animal studies have shown that acupuncture exerts its therapeutic effects on CP and negative emotional states through the modulation of distinct brain regions,[14–16] intricate neural circuits,[17,18] as well as various molecular receptors and pathways.[19–22]

Bibliometrics is an academic discipline dedicated to evaluating published research literature in terms of its quantity, quality, and citation metrics. Utilizing mathematical and statistical methods, bibliometrics quantitatively assesses the citations, authors, institutions, countries, keywords, and other relevant characteristics.[23] Through this process, bibliometrics unveils current research hotspots and emerging trends in specific fields, providing valuable insights for academic decision-making.[24] CiteSpace and VOSviewer are prominent software tools for quantitative literature analysis. Previous publications have witnessed bibliometric investigations pertaining to the general status and research trends concerning acupuncture for CP.[11,25] However, there is still a shortage of bibliometric analyses focusing on CP-related depression or anxiety management. To address this research gap, the present study seeks to bridge the knowledge divide by employing CiteSpace and VOSviewer software for an extensive bibliometric analysis. This comprehensive examination aims to shed light on the emerging research trends pertaining to depression or anxiety in the context of acupuncture application for CP.

# Methods
## Data Collection
All articles in this study were sourced from the Science Citation Index Expanded (SCI-expanded), Social Sciences Citation Index (SSCI), and Emerging Sources Citation Index (ESCI) database in the Web of Science Core Collection from January 1, 2003 to August 1, 2023. The data search strategy included the topic "acupuncture therapy" "chronic pain" "depression" and "anxiety". The language was restricted to English but without limitations regarding to country of publication. The specific search strategy and results are detailed in Table 1. In total, 405 original studies were retrieved. We excluded literature that lacked relevance to acupuncture for CP-related depression or anxiety, and at the same time, articles devoid of abstracts, letters, and book reviews were also excluded, resulting in the exclusion of 151 articles. Ultimately, 254 articles were retained for further visualization and analysis.

## Data Analysis
CiteSpace, invented by Professor Chaomei Chen, is a powerful bibliometric visualization analysis software extensively employed in calculating centrality measures and generating visual maps of keyword bursts, citation bursts, and keyword clusters.[26] Particularly, high centrality values are often regarded as pivotal turning points or tipping points within

**Table 1** The Topic Search Query

| Set | Results | Search Query |
|---|---|---|
| #1 | 24,489 | TS=(acupuncture OR acupuncture therapy OR manual acupuncture OR electroacupuncture OR electrical acupuncture OR acupoint* OR acupressure OR auricular acupuncture OR ear acupuncture OR moxibustion OR moxabustion OR catgut embedding OR catgut implantation at acupoint) |
| #2 | 392,115 | TS=(chronic pain OR chronic low back pain OR chronic neck pain OR chronic musculoskeletal pain OR chronic headache OR chronic migraine OR osteoarthritis OR rheumatoid arthritis OR irritable bowel syndrome OR fibromyalgia OR chronic angina pectoris OR chronic sciatica OR chronic biliary colic OR chronic neuropathic pain OR chronic pelvic pain OR chronic postsurgical pain) |
| #3 | 717,259 | TS=(depression OR depressive symptom OR gloomy OR depressive OR anxiety OR anxiety disorder) |
| #4 | 405 | #1 AND #2 AND #3 |

a specific field. In this study, we utilized CiteSpace (version 5.7.R5) with the following parameter settings: (1) a time slice spanning from 2003 to 2023, with each slice representing a single year; (2) one node type selected at a time for analysis; and (3) the application of pathfinder and pruning techniques to slice networks, retain the default values for remaining parameters. Additionally, we obtained the impact factors (IF) of journals from the 2022 Journal Citation Report.

VOSviewer, a software created by Leiden University, is specifically designed for constructing and visualizing bibliometric networks.[27] By leveraging the power of bibliometrics, VOSviewer enables researchers to comprehensively grasp the prevailing research hotspots and emerging trends within a given field. In this study, we employed VOSviewer (version 1.6.19) to analyze various aspects, including journals, co-cited journals, countries, institutions, authors, cited authors, keywords, and references, to generate a visually informative network map. In this map, distinct nodes symbolize different elements of interest, with the size of each node reflecting the number of references attributed to it. Meanwhile, the connecting lines between nodes illustrate the degree of association between them, whereby thicker lines and shorter distances indicate stronger connections.

# Results
## Analysis of Annual Publications
This study encompasses a total of 254 publications, as demonstrated in Figure 1, illustrating their yearly distribution. The analysis reveals a varying yet overall ascending trend in the number of literature focusing on acupuncture for CP-related depression or anxiety from 2003 to 2023. During the period from 2003 to 2013, the number of publications remained relatively stable at a low level. However, a significant surge in publications occurred in 2014, with 18 articles specifically focused on acupuncture for CP-related depression or anxiety. From 2015 to 2018, there was a decline in the number of publications was observed. Nonetheless, continuous growth in publication count from 2019 to 2022. As of now, within the first eight months of 2023, a total of 20 articles have already been published, indicating a promising outlook for sustained publication growth throughout the year. Remarkably, 142 articles have been published within the past 5 years, accounting for 55.9% of the overall publication count.

## Analysis of Journals
Results of statistical data showed that a total of 254 articles were distributed to 130 journals. Table 2 lists the top ten journals in research on acupuncture for CP-related depression or anxiety. It is worth noting that the majority of these journals were affiliated with publishers based in the United Kingdom and the United States. The top three journals in
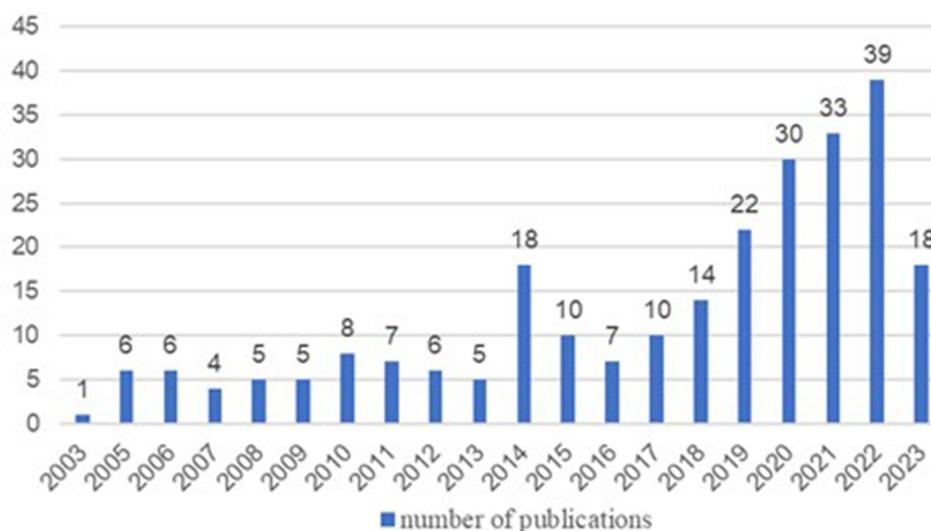
**Figure 1** The number of annual publications on acupuncture for CP-related depression or anxiety.

**Table 2** Top 10 Journals on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Journal | IF (2022) | Country |
|------|-----------|---------|-----------|---------|
| 1 | 20 | Trials | 2.5 | England |
| 2 | 11 | Pain Medicine | 3.1 | England |
| 3 | 11 | Medicine | 1.6 | USA |
| 4 | 9 | Evidence-Based Complementary and Alternative Medicine | - | USA |
| 5 | 8 | Complementary Therapies in Medicine | 3.6 | USA |
| 6 | 7 | Frontiers in Neuroscience | 4.3 | Switzerland |
| 7 | 6 | BMJ Open | 2.9 | England |
| 8 | 6 | Journal of Alternative and Complementary Medicine | 2.6 | USA |
| 9 | 6 | Acupuncture in Medicine | 2.5 | England |
| 10 | 5 | BMC Complementary and Alternative Medicine | - | England |

terms of publications were *Trials* (20 counts), *Pain Medicine* (11 counts), and *Medicine* (11 counts). *Frontiers in Neuroscience* ranked sixth (7 counts) and had the highest IF of 4.3.

## Analysis Cited Journals

The analysis of the co-citation of journals provides a valuable means to visualize the distribution of information sources and identify noteworthy journals within a specific field.[24] In this study, a total of 2926 cited sources were referred by the 254 publications. Figure 2 portrays a comprehensive map comprising 51 journals that have been cited over 40 times each.



**Figure 2** Network visualization map of co-cited journals related to acupuncture for CP-related depression or anxiety.

According to Table 3, the top five journals in terms of co-citation frequency were *Pain* (492 citations), *Evidence-Based Complementary and Alternative Medicine* (204 citations), *Cochrane Database of Systematic Reviews* (190 citations), *JAMA - Journal of the American Medical Association* (154 citations), and *Journal of Pain* (153 citations), respectively. The top five journals in terms of centrality were *BMJ-British Medical Journal* (0.67), *Archives of Internal Medicine* (0.67), *Arthritis and Rheumatism* (0.61), *Cochrane Database of Systematic Reviews* (0.44), *Complement Therapies in Medicine* (0.41).

## Analysis of Countries

To comprehensively comprehend the global landscape of acupuncture research focusing on CP-related depression or anxiety, we employed VOSviewer software for statistical analysis and data visualization. The generated results unveiled the involvement of 36 countries in this field of research between 2003 and 2023. Figure 3 shows the geographical distribution of acupuncture for CP-related depression or anxiety. Table 4 illustrates the top five countries and their number and citations of published papers. Notably, China emerged as the frontrunner with the highest number of articles with 111 articles, followed closely by the United States with 72 articles, South Korea with 22 articles, the United Kingdom with 13 articles, and Australia with 10 articles. Furthermore, in terms of citation impact, the United Kingdom stood out as the leading country with a remarkable number of 3643 citations. The United States followed suit with 1922 citations, while China garnered 920 citations. South Korea and Turkey also received significant citation counts, with 405 and 230 citations respectively, showcasing their contributions to the field.

Figure 4 presents a visual analysis of global research contributions in the field of acupuncture for CP-related depression or anxiety The analysis successfully identified four clusters. The United States, China, and South Korea exhibit a higher density of connections, indicating their extensive collaborative efforts. What's more, the United States demonstrates a close working relationship with China. However, it is evident from the visualization that the number of countries globally focusing on acupuncture as a treatment for CP-related depression or anxiety remains relatively limited.

## Analysis of Institutions

A total of 514 organizations participated in the study of acupuncture for CP-related depression or anxiety. Table 5 presents the top 5 author's institutions based on their contributions to published works in this domain. Beijing University of Traditional Chinese Medicine, Chengdu University of Traditional Chinese Medicine, and Zhejiang University of Traditional Chinese Medicine all secured the highest number of publications, with each institution contributing 16 articles. This is closely followed by Kyung Hee University with 11 publications and Shanghai University of Traditional Chinese Medicine with 10 publications. Examining the centrality rankings, Kyung Hee University secures the highest position (0.05). Brigham & Women's Hospital, Columbia University, Beijing University of Traditional Chinese Medicine, and the Chinese Academy of Chinese Medical Science also occupy noteworthy positions in terms of centrality index rankings.

**Table 3** Top 5 Cited Journals on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Cited Journal | Centrality | Cited Journal |
|---|---|---|---|---|
| 1 | 492 | Pain | 0.67 | BMJ-British Medical Journal |
| 2 | 204 | Evidence-Based Complementary and Alternative Medicine | 0.67 | Archives of Internal Medicine |
| 3 | 190 | Cochrane Database of Systematic Reviews | 0.61 | Arthritis and Rheumatism |
| 4 | 154 | JAMA-Journal of the American Medical Association | 0.44 | Cochrane Database of Systematic Reviews |
| 5 | 153 | Journal of Pain | 0.41 | Complement Therapies in Medicine |

**Figure 3** Geographical distribution of acupuncture for CP-related depression or anxiety.

## Analysis of Authors and Cited Authors

A total of 1484 authors participated in the study of acupuncture for CP-related depression or anxiety. Table 6 presents the top 10 most prolific authors, collectively contributing 75 articles, which accounts for an impressive 29.53% of the total publications. Notably, Fang JQ (13 counts), Shao XM (10 counts), and Du JY (8 counts), all hailing from China, position them as the top three authors in terms of article output. These findings shed light on the notable interest and engagement of Chinese researchers in this specific area. Moreover, Table 6 further emphasizes the stature of the top 10 most cited authors in the context of acupuncture for CP-related depression or anxiety. In the forefront, Vickers AJ stands out with a citation count of 55, followed closely by Macpherson H with 49 citations and Wolfe F with 45 citations. These numbers underscore the significant influence wielded by these authors within the scholarly community in this field. Furthermore, the three authors with the highest centrality were Berman BM (0.45), Macpherson H (0.4), and Wolfe F (0.31), which indicates that these authors are important authors of their cooperation with other authors.
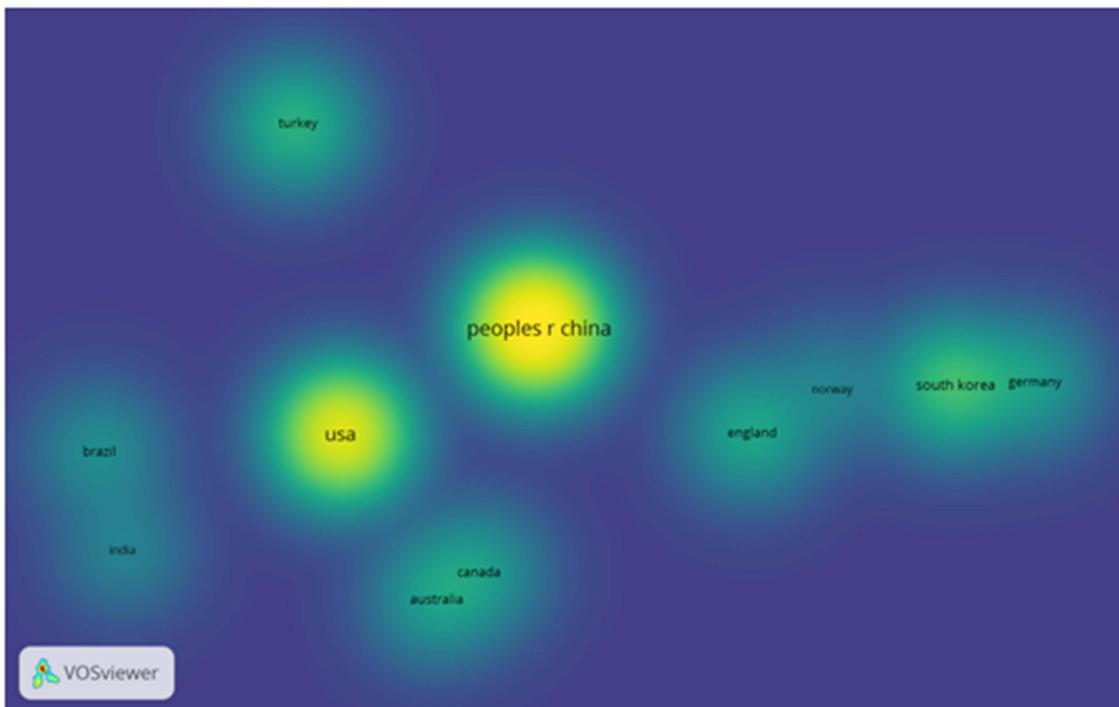
**Table 4** Top 5 Countries on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Country | Citations | Country |
|---|---|---|---|---|
| 1 | 111 | China | 3643 | England |
| 2 | 72 | USA | 1922 | USA |
| 3 | 22 | South Korea | 920 | China |
| 4 | 13 | England | 405 | South Korea |
| 5 | 10 | Australia | 230 | Turkey |

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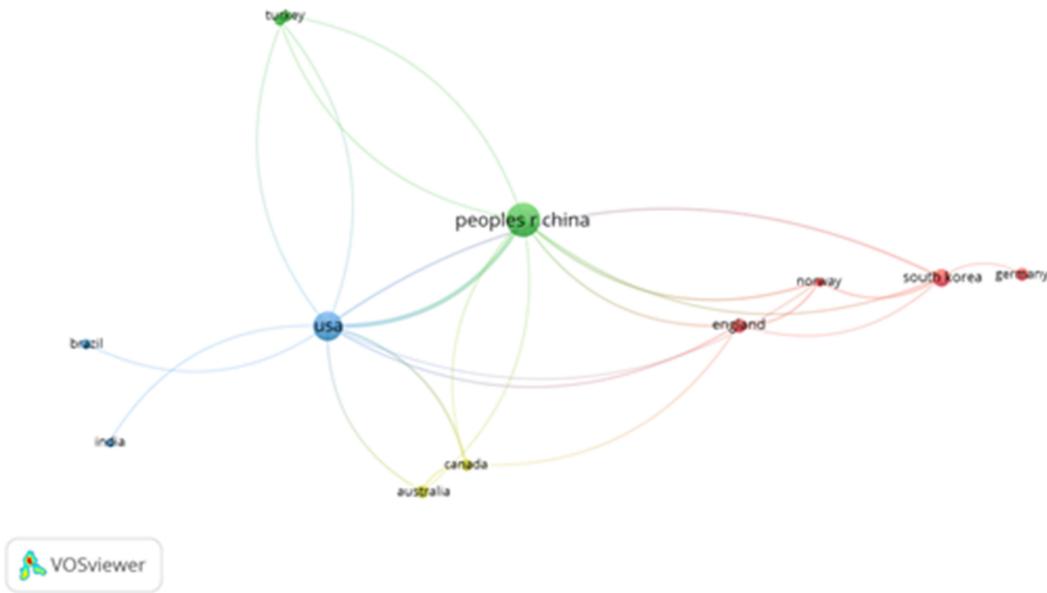


B



**Figure 4** (**A**) Network visualization map of countries related to acupuncture for CP-related depression or anxiety. (**B**) The density visualization of countries related to acupuncture for CP-related depression or anxiety.

**Table 5** Top 5 Institutions on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Institution | Centrality | Institution |
|------|-----------|-------------|------------|-------------|
| 1 | 16 | Beijing University of Chinese Medicine | 0.05 | Kyung Hee University |
| 2 | 16 | Chengdu University of Traditional Chinese Medicine | 0.03 | Brigham&Women's Hospital |
| 3 | 16 | Zhejiang Chinese Medical University | 0.02 | Columbia University |
| 4 | 11 | Kyung Hee University | 0.01 | Beijing University of Chinese Medicine |
| 5 | 10 | Shanghai University of Traditional Chinese Medicine | 0.01 | Chinese Academy of Chinese Medical Science |

**Table 6** Top 10 Productive Authors and Co-Cited Authors on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Author | Cited Time | Cited Author | Centrality | Cited Author |
|------|-----------|--------|------------|--------------|------------|--------------|
| 1 | 13 | Fang JQ | 55 | Vickers AJ | 0.45 | Berman BM |
| 2 | 10 | Shao XM | 49 | Macpherson H | 0.4 | Witt CM |
| 3 | 8 | Du JY | 45 | Wolfe F | 0.31 | Manheimer E |
| 4 | 7 | Shen Z | 39 | Linde K | 0.2 | Vickers AJ |
| 5 | 7 | He XF | 30 | Ware JE | 0.16 | Bair MJ |
| 6 | 6 | Sun J | 29 | Han JS | 0.16 | Doan L |
| 7 | 6 | Jiang YL | 28 | Drossman DA | 0.14 | Drossman DA |
| 8 | 6 | Kilgler B | 27 | Berman BM | 0.13 | Coutaux A |
| 9 | 6 | Lin YW | 27 | Manheimer E | 0.1 | Linde K |
| 10 | 6 | Zheng H | 27 | Ventegodt S | 0.1 | Chen Y |

## Analysis of Cited-References

Co-citation refers to the phenomenon where two articles are mentioned in the reference list of a third article, thus establishing a co-citation relationship. The frequency of co-citation between two articles reflects the degree of similarity between them. The greater the number of times two articles are cited together, the more closely related they are considered to be. This co-citation analysis of high frequency and centrality allows for the identification of core research within the field. Figure 5 shows a network visualization map comprising 21 articles that have been cited over 10 times each.

In this study, a total of 254 articles generated 9998 references. Tables 7 and 8 present the top 5 articles with co-citation frequency and centrality, respectively, which effectively highlight the literature with significant impact and centrality in the field. Fascinatingly, among the 5 most co-cited references include three meta-analysis, one review, and one original research. Of these five references, two references were individual patient data (IPD) meta-analysis and updated IPD meta-analysis on acupuncture for CP-related depression or anxiety published by Vickers AJ.[28,29] The acupuncture clinical trials with inadequate methodological quality have significantly diminished the credibility and value of many meta-analysis conducted in this field. However, the utilization of IPD meta-analysis, which involves the examination of individual patient data derived from meticulously conducted clinical trials, has proven to be highly valuable in guiding clinical practice. These studies provide evidence suggesting the effectiveness of acupuncture in treating CP. The review on acupuncture published by Ramsay DJ indicated the widespread utilization of acupuncture in the United States, as well as the challenges it encounters.[30] The SF-36, introduced by Ware et al,[31] has gained widespread recognition as a comprehensive general health questionnaire. It encompasses clinical performance scores for various symptoms, including pain and mood, making it one of the commonly employed indicators to evaluate the efficacy of clinical acupuncture treatment. Deare et al[32] have established the efficacy and safety of acupuncture in the treatment of fibromyalgia through meta-analysis. Their findings not only confirm the positive outcomes of acupuncture in managing fibromyalgia symptoms but also highlight its potential to reduce depressive symptoms among patients afflicted with this condition. In terms of centrality, an updated IPD meta-analysis by Vickers AJ et al concluded that acupuncture stands as
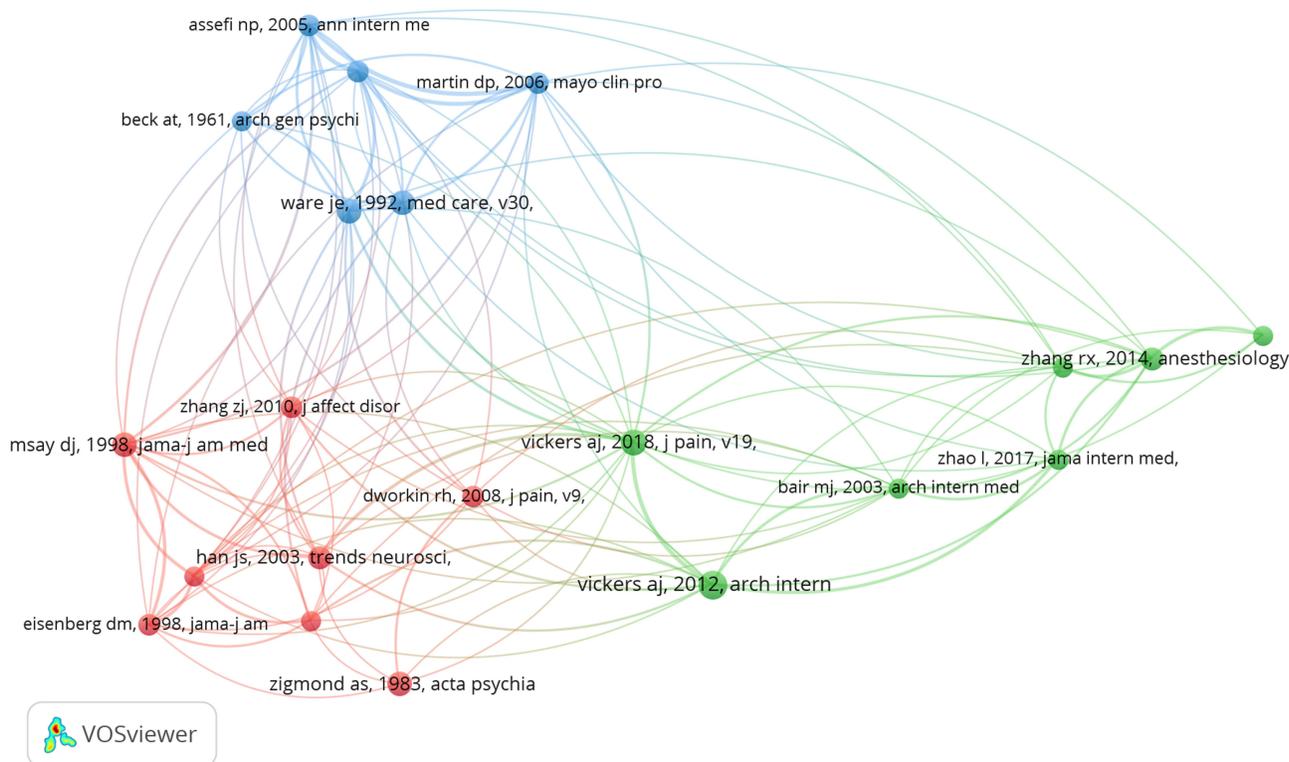
**Figure 5** Network visualization map of co-cited references related to acupuncture for CP-related depression or anxiety.

an effective treatment for CP, exhibiting enduring treatment effects.[29] Their analysis reveals that variances in the magnitude of acupuncture's effectiveness across trials are primarily influenced by discrepancies in the treatment administered to the control group, rather than variances in the characteristics of the acupuncture treatment itself.

## Analysis of Keywords

The analysis of keywords co-occurrence serves as a valuable approach to identifying prominent research hotspots within related publications.[36] In this study, we employed VOSviewer software to construct a visual network view depicting the co-occurrence of keywords across 254 documents. As depicted in Figure 6, we employed 36 keywords with a frequency equal to or greater than 10 for co-occurrence analysis. Table 9 presents the top 10 most frequent keywords and the centrality keywords, respectively. The most frequent keywords were "acupuncture", "depression", "chronic pain", "electroacupuncture", "pain", "management", "anxiety", "quality of life", "low-back pain", and "randomized controlled trial". The top 10 keywords in terms of centrality were "acupuncture", "chronic pain", "arthritis", "quality-of-life", "activation", "placebo", "depression", "management", "acupuncture analgesia", and "anxiety".

**Table 7** Top 5 Cited References with Frequency on Acupuncture for CP-Related Depression or Anxiety

| Rank | Cited Reference | Frequency | Representative Author (Publication Year) |
|---|---|---|---|
| 1 | Acupuncture for chronic pain: individual patients data meta-analysis | 20 | Vickers AJ (2012)[28] |
| 2 | Acupuncture for chronic pain: update of an individual patient data meta-analysis | 16 | Vickers AJ (2018)[29] |
| 3 | Acupuncture | 15 | Ramsay DJ (1998)[30] |
| 4 | The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection | 15 | Ware JE (1992)[31] |
| 5 | Acupuncture for treating fibromyalgia | 14 | Deare JC (2013)[32] |

**Table 8** Top 5 Cited References with Centrality Values on Acupuncture for CP-Related Depression or Anxiety

| Rank | Cited Reference | Centrality | Representative Author (Publication Year) |
|---|---|---|---|
| 1 | Acupuncture for chronic pain: update of an individual patient data meta-analysis | 0.08 | Vickers AJ (2018)[29] |
| 2 | Acupuncture for depression | 0.07 | Smith CA (2018)[33] |
| 3 | Effects of acupuncture treatment on fibromyalgia symptoms, serotonin, and substance p levels: a randomized sham and placebo-controlled clinical trial | 0.04 | Karatay S (2018)[34] |
| 4 | Acupuncture for Diarrhoea-Predominant Irritable Bowel Syndrome: A Network Meta-Analysis | 0.03 | Zhu L (2018)[35] |
| 5 | Electroacupuncture Alleviates Anxiety-Like Behaviors Induced by Chronic Neuropathic Pain via Regulating Different Dopamine Receptors of the Basolateral Amygdala | 0.03 | Wu M (2022)[19] |

## Analysis of Burst Keywords

Analysis of burst keywords reveals the significant emergence of particular terms within specific time intervals.[24] This invaluable information provides insights into the ongoing evolution of research areas and serves as a compass delineating recent trends in scholarly pursuits. Moreover, burst keywords have the remarkable potential to forecast future research directions.[37] In Figure 7, we present the top 10 keywords exhibiting the strongest citation bursts. Over the span of two decades, "irritable bowel syndrome" ranked first with the highest burst strength (4.02), closely followed by "disability" (3.57) and "clinical trial" (2.99). Notably, "irritable bowel syndrome" "epidemiology" "stress", and "neuropathic pain" demonstrated the most pronounced bursts in recent years, suggesting their continued prominence as research hotspots in forthcoming studies.

## Discussion

This study conducted a comprehensive bibliometric analysis of 254 publications, aiming to illuminate the research hotspots and trends on acupuncture as a therapeutic modality for CP-related depression or anxiety. Findings revealed a notable pattern in publication output: from 2003 to 2013, the annual publication count remained relatively stable at approximately 5, however, a significant surge commenced in 2014, with a subsequent plateau at over 20 publications from 2019 onwards. This observation underscores the growing attention of scholars for acupuncture in both CP-related emotional co-morbidities. Among the prominent publications in this domain, *Trials* stands out as one of the most prolific journals, predominantly featuring randomized clinical trial protocols. This indicates the predominant emphasis on preclinical investigations, highlighting that research on the application of acupuncture in CP management and its comorbidity with depression or anxiety is currently undergoing a transitional phase, progressing from preclinical to clinical settings. This pattern suggests a promising trajectory, anticipating a potential surge in the number of clinical studies in the coming years. However, our findings indicated that the relatively lower impact factors observed in the top 10 journals signify a formidable challenge in the publication of research emphasizing the application of acupuncture as an intervention for CP-related depression or anxiety within high-quality journals. For the cited journals, *Pain* garnered the highest number of citations, while *BMJ-British Medical Journal* emerged as the foremost source journal in terms of centrality.

In terms of distribution of countries, China, the USA, South Korea, England, and Australia were the top five countries. Of the 254 papers analyzed, research from China and the USA constituted a substantial 72%, highlighting the pivotal role occupied by these two countries in this field. Relative to the USA and England, China showcases a high volume of publications, which is inherently linked to its status as the birthplace of acupuncture. However, the corresponding citation count falls short, indicating the need for further improvement in this domain. Hence, to enhance the research quality, it is imperative to foster and sustain ongoing international collaborations. Regarding research institutions, Beijing University of Chinese Medicine, Chengdu University of Traditional Chinese Medicine, and Zhejiang Chinese Medical University with the highest frequency of publications, However, in terms of centrality, the level of collaboration among these institutions remained low, indicating insufficient cooperation in this field.

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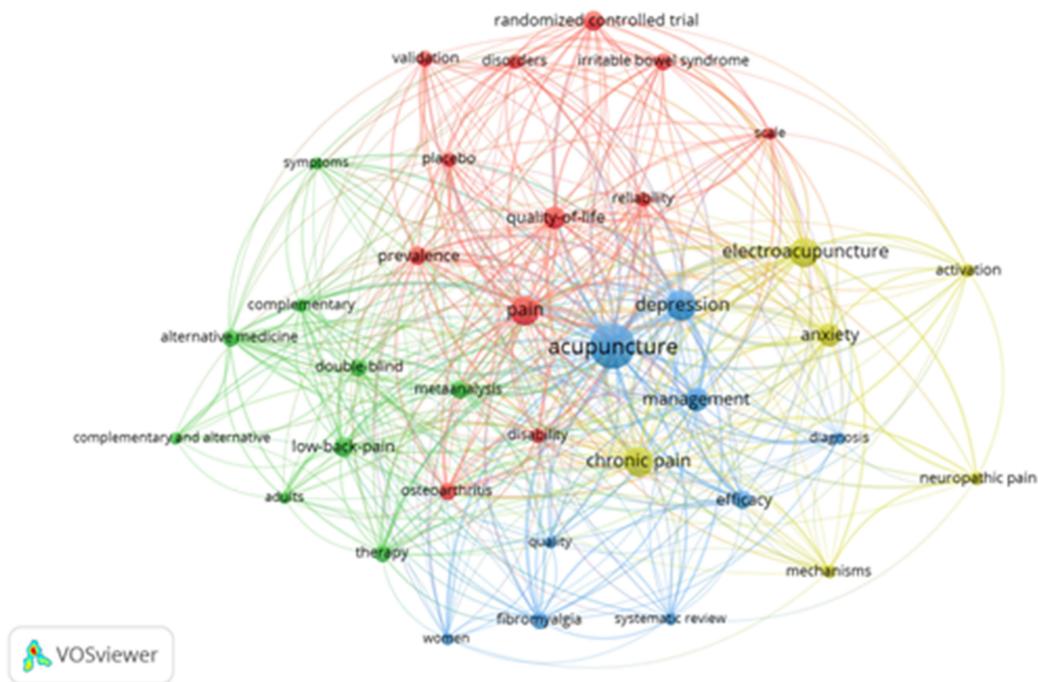


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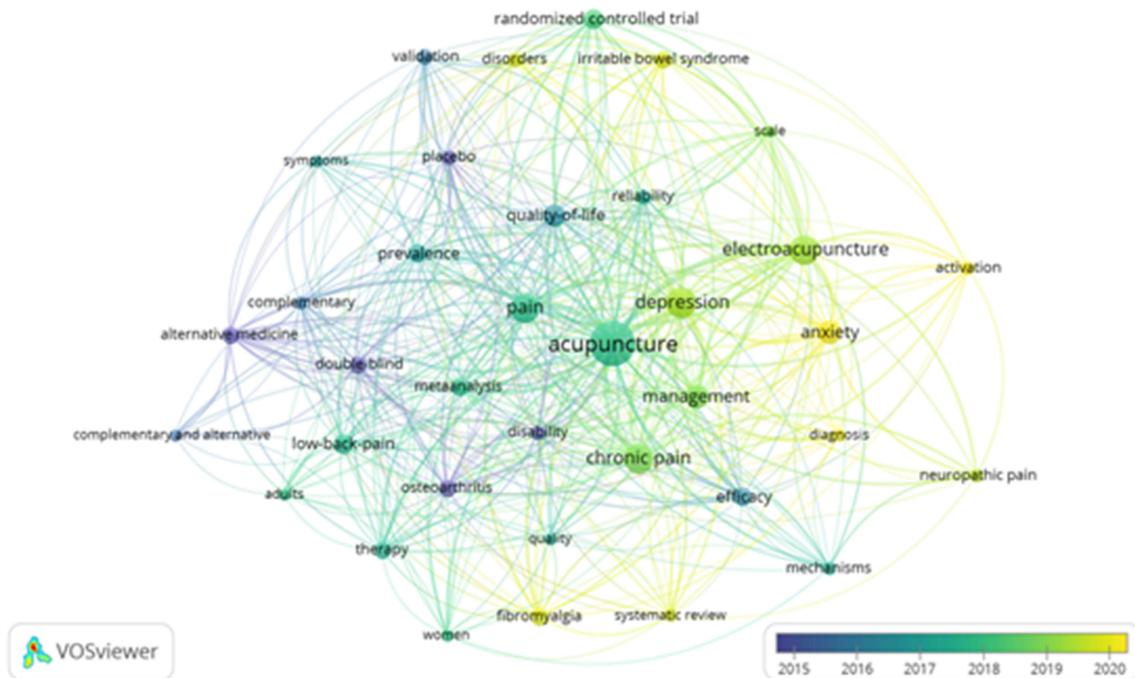


**Figure 6** (**A**) Network visualization map of keywords related to acupuncture for CP-related depression or anxiety. (**B**) The overlay visualization of keywords related to acupuncture for CP-related depression or anxiety.

**Table 9** Top 10 Keywords on Acupuncture for CP-Related Depression or Anxiety

| Rank | Frequency | Keywords | Centrality | Keywords |
|------|-----------|----------|------------|----------|
| 1 | 122 | Acupuncture | 0.71 | Acupuncture |
| 2 | 56 | Depression | 0.65 | Chronic pain |
| 3 | 51 | Chronic pain | 0.43 | Arthritis |
| 4 | 50 | Electroacupuncture | 0.29 | Quality of life |
| 5 | 50 | Pain | 0.29 | Activation |
| 6 | 33 | Management | 0.25 | Placebo |
| 7 | 32 | Anxiety | 0.23 | Depression |
| 8 | 30 | Quality of life | 0.23 | Management |
| 9 | 23 | Low-back pain | 0.23 | Acupuncture analgesia |
| 10 | 23 | Randomized controlled trial | 0.21 | Anxiety |

In terms of authors, Fang JQ from the Zhejiang Chinese Medical University has the highest number of publications, while Vickers AJ has the greatest influence in this field. In recent years, Prof. Fang JQ and his team have dedicated their research efforts to the investigation of comorbidities between CP and mood. His studies primarily concentrate on elucidating the mechanism by which acupuncture impacts CP and anxiety comorbidities.[18,19,38–40] Through the analysis of co-cited authors, Vickers AJ and Berman BM were the most influential authors with the highest cited frequency and highest centrality, respectively. This underscores their crucial impact in the field of acupuncture for the treatment of CP-related depression or anxiety. Overall, authors with the highest number of publications have not established close collaborative relationships, with the majority of them being affiliated with the same country or institution. To advance research in this field, it is crucial to enhance cooperation between countries and institutions.

The research hotspots or emerging trends could be identified via analysis of cited references and keywords over a while.[24] Acupuncture for CP-related depression or anxiety common types of pain include fibromyalgia, IBS, and neuropathic pain. Our findings suggest that fibromyalgia is garnering significant attention within this research domain. Fibromyalgia is a chronic disorder characterized by widespread musculoskeletal pain, accompanied by multiple tender areas and morning stiffness. It is often accompanied by various symptoms, including fatigue, sleep disturbances, and mood disorders. The prevalence of fibromyalgia in the general population ranges from 2% to 3%,[41] while the incidence of depression among individuals with fibromyalgia is reported to be between 20% and 80%.[42] In recent years, several RCTs have reported the efficacy of acupuncture in treating fibromyalgia, highlighting its potential benefits.[43–45]



**Top 10 Keywords with the Strongest Citation Bursts**

| Keywords | Year | Strength | Begin | End | 2003 – 2023 |
|----------|------|----------|-------|-----|-------------|
| disability | 2005 | 3.57 | **2011** | 2017 | |
| clinical trial | 2009 | 2.99 | **2012** | 2014 | |
| reliability | 2014 | 2.53 | **2014** | 2020 | |
| metaanalysis | 2013 | 2.58 | **2016** | 2018 | |
| low back pain | 2005 | 2.49 | **2017** | 2020 | |
| irritable bowel syndrome | 2016 | 4.02 | **2019** | 2023 | |
| disorder | 2014 | 2.89 | **2019** | 2021 | |
| epidemiology | 2021 | 2.62 | **2021** | 2023 | |
| stress | 2021 | 2.62 | **2021** | 2023 | |
| neuropathic pain | 2008 | 2.56 | **2021** | 2023 | |

**Figure 7** Top 10 keywords with the strongest citation burst related to acupuncture for CP-related depression or anxiety.

Furthermore, a comprehensive and high-quality review study has provided evidence supporting the effectiveness of acupuncture as a therapeutic approach for fibromyalgia.[46] Simultaneously, a study also suggests that while a direct comparison showing the superiority of acupuncture over other therapies may be lacking, an increasing body of evidence supports the additional efficacy of acupuncture as a component of multimodal approaches when compared to conventional treatments.[47]

The newest burst keyword "irritable bowel syndrome" with the highest strength value, which indicates IBS may be a research trend in acupuncture for CP-related depression or anxiety. IBS stands as one of the most prevalent chronic gastrointestinal disorders, characterized by recurrent abdominal pain and accompanying abnormalities in fecal shape or bowel habits. Patients with IBS often experience severe psychosocial difficulties, with anxiety and depression emerging as particularly common comorbidities.[48,49] A meta-analysis has demonstrated that acupuncture exhibits greater efficacy in improving gastrointestinal symptoms and quality of life in IBS when compared to pharmaceutical drugs.[50] An additional meta-analysis revealed that acupuncture can considerably ameliorate depression and anxiety in patients with IBS when compared to conventional orally-taken Western medicine.[51] Nevertheless, it is important to acknowledge that the included studies exhibit limitations, such as small sample sizes and significant heterogeneity. Consequently, further high-quality meta-analysis are necessary in the future to establish the efficacy of acupuncture.

Of particular interest, neuropathic pain is caused by peripheral or central nervous system dysfunction, often accompanied by spontaneous pain. neuropathic pain is often accompanied by different degrees of sleep disorder, anxiety, and depression.[52] Our search findings indicated that chronic neuropathic pain serves as the prevailing animal model utilized in experimental studies investigating CP-related depression or anxiety. Notably, electroacupuncture emerges as the most extensively explored intervention within this context. This indicates that neuropathic pain is a trend in exploring the mechanism of acupuncture research. Some animal studies have indicated that electroacupuncture exhibits the potential to alleviate chronic neuropathic pain-related depression or anxiety, primarily through its modulation of various molecular targets and neural circuits.[22,53–56] What's more, our results showed that the RCTs and evidence-based evaluation were the current research type. By conducting rigorous RCTs and Meta-analysis, we can accurately ascertain the efficacy of acupuncture.

This study acknowledges several limitations that necessitate attention. The utilization of software algorithms poses a challenge when attempting to simultaneously analyze multiple databases, thereby risking the exclusion of relevant literature. Furthermore, this study only analyzed the English literature, which led to a less comprehensive literature collection. Finally, the conclusion of our search in August 2023 may have further constrained our findings by not considering unpublished works.

## Conclusion

This bibliometric study provided the research status and emerging trends of acupuncture for CP-related depression or anxiety from 2003 to 2023. The findings of this research have the potential to assist patients grappling with CP concomitant with depression or anxiety in expanding their array of treatment options and establishing a research foundation for further investigations in this domain. Over the past two decades, there has been a substantial increase in the annual volume of publications in this field, indicating a heightened emphasis from researchers on addressing depression or anxiety linked to CP through the use of acupuncture. China and its institutions excel with the highest publication volume in this field. Studies have been published in the form of protocol, which indicates the continued necessity for additional randomized controlled trials. Furthermore, cooperation and communications between different countries and institutions still need to be strengthened to promote the development of research. The new research hotspots include clinical trials, the mechanism of acupuncture for CP-related mood disorders, and the research of evidence-based clinical evaluation. The systematic review and meta-analysis were the main methodology to determine the efficacy of acupuncture on CP-related depression or anxiety, however, publication bias is a problem to be solved. Therefore, the high-quality clinical evidence of acupuncture needs to be further developed. In summary, this investigation advances the collective knowledge in this domain and propels future researchers to explore new directions.

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## Disclosure

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