

Bibliometric Visualization and Google Trends Analysis of Electroacupuncture Analgesia

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Abstract: Objective: To explore research hotspots and trends in the application of electroacupuncture techniques in the field of pain management, providing reference for further studies. Methods: We retrieved relevant literature from the Web of Science Core Collection database covering 1 January 2006, to 15 August 2025. Using CiteSpace software, we generated visualization maps based on publication regions, institutions, authors, and keywords to investigate research hotspots and development trends in this domain. Concurrently, Bibliometrix 5.1.0 software and Google Trends were employed to obtain corresponding public search trends, evaluating the relationship between academic research intensity and public attention. Results: A total of 542 articles were included. Publication volume initially increased then declined; core regions exhibited close collaboration; authors primarily engaged in intra-team cooperation; topics like “chronic pain” and ‘migraine’ were hotspots aligning academic and public interest, while “electroacupuncture” showed a recognition gap. Conclusions: Current electroacupuncture analgesia research focuses on neurobiological mechanisms, acupoint and parameter optimization, and combined applications. Research exhibits phased development with gaps between academic and public understanding. Development remains uneven across institutions, authors, and regions, with limited cross-team, cross-regional, and international collaboration—most partnerships being internal. Future efforts should strengthen multi-stakeholder cooperation, address knowledge gaps through science communication, integrate with smart technologies for enhanced clinical relevance, and elevate practical value.

Keywords: electroacupuncture therapy; bibliometrics; Google Trends; pain management; scope review

1. Introduction

Electroacupuncture (EA) originated in the 1930s, integrating traditional acupuncture with electrical stimulation to enhance therapeutic effects through pulsed currents. Its mechanisms may involve regulating neurotransmitters, suppressing inflammation, and promoting neural plasticity [1]. In recent years, its application in analgesia has garnered extensive attention and in-depth research. Studies have explored the practical value of EA in postoperative pain management, demonstrating its efficacy in alleviating postoperative discomfort [2]. Additionally, EA has shown promising therapeutic potential in nerve injury repair [3], chronic pain regulation [4], and nerve regeneration promotion [5].

While international research interest in analgesia continues to rise, studies specifically addressing electroacupuncture applications remain relatively scarce, lacking systematic bibliometric analysis. This paper employs CiteSpace, Bibliometrix, and Google Trends to conduct a visual analysis of core Web of Science literature over the past two decades. The aim is to identify research hotspots and trends, providing reference for future research directions.

2. Data and Methods

2.1. Data Sources and Retrieval Strategy

This study utilized the Web of Science Core Collection as the primary literature source, employing precise keyword retrieval with the following query: TS = ((electro-acupuncture OR electroacupuncture OR “electro acupuncture” OR “electric acupuncture” OR “electroacupuncture therapy” OR EA) AND (analgesia OR “pain relief” OR “pain management” OR “pain control” OR “analgesic effect” OR “analgesic mechanism” OR nociception OR antinociceptive OR “pain threshold” OR “pain sensitivity” OR “pain modulation” OR “chronic pain” OR “acute pain” OR “persistent pain” OR “neuropathic pain” OR “inflammatory pain” OR “visceral pain” OR “postoperative pain” OR “cancer pain” OR “low back pain” OR “headache” OR ‘migraine’ OR “arthritis pain” OR fibromyalgia OR dysmenorrhea OR sciatica OR “trigeminal neuralgia”)) NOT TS = (animal* OR rat OR mice OR mouse OR rodent*). Document types were restricted to research articles and reviews, with core research themes focused on the clinical application of electroacupuncture analgesia. The time period was limited to January 1, 2006, to August 15, 2025.

2.2. Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) Publication type was academic journal articles; (2) Content related to the application of electroacupuncture in analgesia; (3) Language was English. Exclusion criteria were: (1) Publication type was theses, conference proceedings, news articles, etc.; (2) Content unrelated to electroacupuncture application in analgesia; (3) Duplicate publications; (4) Missing publication information.

2.3. Methods

2.3.1. Bibliometric Visualization

Using CiteSpace 6.3.R1 software, visualize research patterns through maps of publication regions, institutions, authors, high-frequency keywords, and keyword co-occurrence timelines to analyze research hotspots and trends in electroacupuncture for pain relief.

2.3.2. Google Trends Comparative Analysis

First, Bibliometrix 5.1.0 software was employed to extract and standardize high-frequency keywords. Selection criteria were as follows: (1) High frequency in bibliometric results, reflecting primary research themes in the field; (2) Coverage of both therapeutic modalities and clinical diseases to ensure comprehensive and balanced analysis; (3) Semantically clear and clinically relevant for efficient retrieval and comparison on the Google Trends platform. Each core keyword was supplemented with synonyms and related expressions to broaden search coverage and enhance precision, ensuring the comprehensiveness and representativeness of the Google Trends analysis. Subsequently, the Google Trends tool was employed to obtain global search popularity data from 2006 to 2025. To ensure data comparability, all data undergo min–max normalization (resulting in a standardized range of 0–100), and annual trend curves are plotted accordingly. Kendall’s tau correlation coefficient is used to test the ordinal correlation between academic research trends and public attention trends. The coefficient ranges from -1 to $+1$, with $p < 0.05$ as the threshold for statistical significance.

3. Results

3.1. Bibliometric Findings

A total of 1529 relevant articles were retrieved. After screening, 542 articles were ultimately selected. The literature screening process is illustrated in Figure 1.

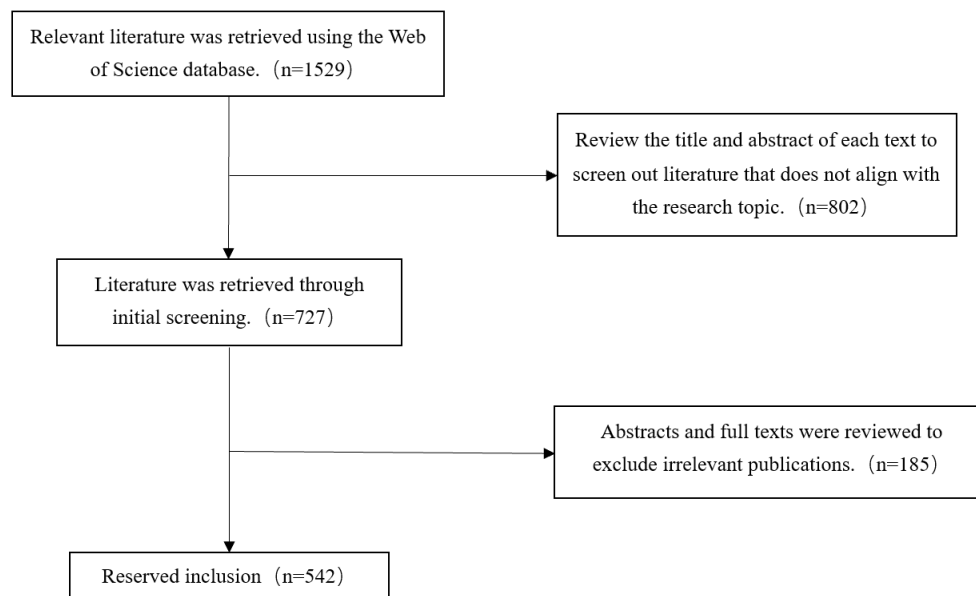


Figure 1. Literature Screening Flowchart.

3.1.1. Research Publication Trends on Electroacupuncture Techniques in Pain Management from 2006 to 2025

The overall publication volume showed an upward trend from 2006 to 2025. Annual publications can be divided into three phases: Phase I (2006–2018) exhibited a fluctuating yet gradual increase. The second phase, spanning 2019–2022, witnessed a sharp surge in publications, with a more than doubling over four years. The single-year increase reached 100% in 2020, and publications peaked at 77 in 2022. The third phase, covering 2023–2025, shows a rapid decline in publications, with 37 papers published as of 15 August 2025. See Figure 2.

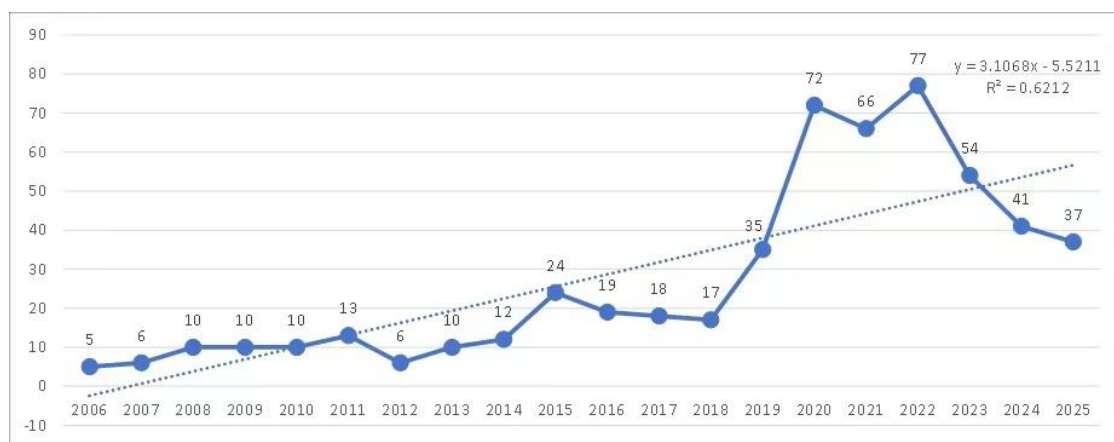


Figure 2. Trend Chart of Research Publications on Electroacupuncture Techniques in Pain Management from 2006 to 2025.

3.1.2. Geographic Distribution of Research Publications on Electroacupuncture Technology in Pain Management from 2006 to 2025

This study encompassed 300 regions. Co-occurrence analysis conducted using CiteSpace software yielded a co-occurrence map comprising 300 nodes, 408 connections, and a density of 0.0091, as shown in Figure 3. This reveals a highly concentrated core region for current research, characterized by close collaboration and resource integration. Core regions within each group exhibit tight cooperation with frequent and stable interactions. However, peripheral regions predominantly represent areas with cooperative potential, where cross-group academic engagement is notably less active than in core regions, reflecting relatively independent collaboration patterns among groups. The top five institutions by publication volume are Beijing University of Chinese Medicine, Chengdu University of Traditional Chinese Medicine, Shanghai University of Traditional Chinese Medicine, Kyung Hee University, Zhejiang Chinese Medical University, and China Academy of Chinese Medical Sciences. Among these, Beijing University of Chinese Medicine leads with 38 publications, as detailed in Table 1.

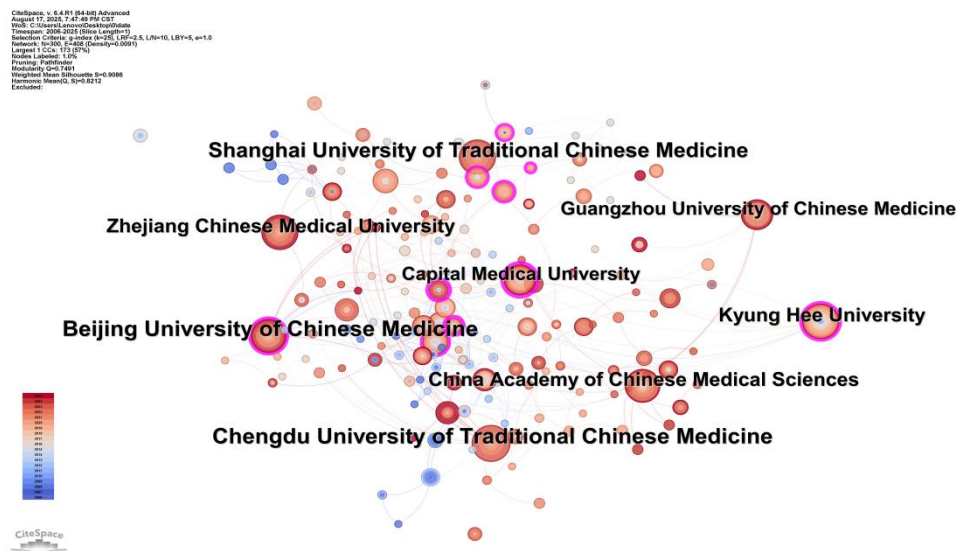


Figure 3. Geographic Distribution of Research Publications on Electroacupuncture Techniques in Pain Management, 2006–2025.

Table 1. Frequency Statistics of Core Regions for Electroacupuncture Technology in Pain Management, 2006–2025.

Number	Frequency	Year	Author
1	38	2009	Beijing University of Chinese Medicine
2	35	2014	Chengdu University of Traditional Chinese Medicine
3	30	2013	Shanghai University of Traditional Chinese Medicine
4	23	2009	Kyung Hee University
5	23	2018	Zhejiang Chinese Medical University
6	22	2011	China Academy of Chinese Medical Sciences
7	20	2014	Guangzhou University of Chinese Medicine
8	20	2011	Capital Medical University
9	16	2008	Harvard University
10	14	2008	Korea Institute of Oriental Medicine (KIOM)

3.1.3. Distribution of Authors in Research Publications on Electroacupuncture for Pain Relief from 2006 to 2025

This study involved 532 authors. Co-occurrence analysis using CiteSpace software yielded a co-occurrence map comprising 532 nodes, 653 connections, and a density of 0.0046, as shown in Figure 4. This reveals that authors currently engaged in related research exhibit tight internal clustering with limited collaboration between clusters. Collaboration within each group is strong, characterized by frequent and stable interactions among members. However, cooperation between different groups is scarce, with cross-group academic engagement significantly less active than intra-group collaboration. Each group thus displays relatively independent collaborative patterns. The top five authors by publication volume are Zhao, Ling; Fang, Jianqiao; Zheng, Zhen; Liang, Yi; and Liang, Fanrong. Among them, Zhao, Ling is the most prolific author, having published 8 articles, as shown in Table 2.

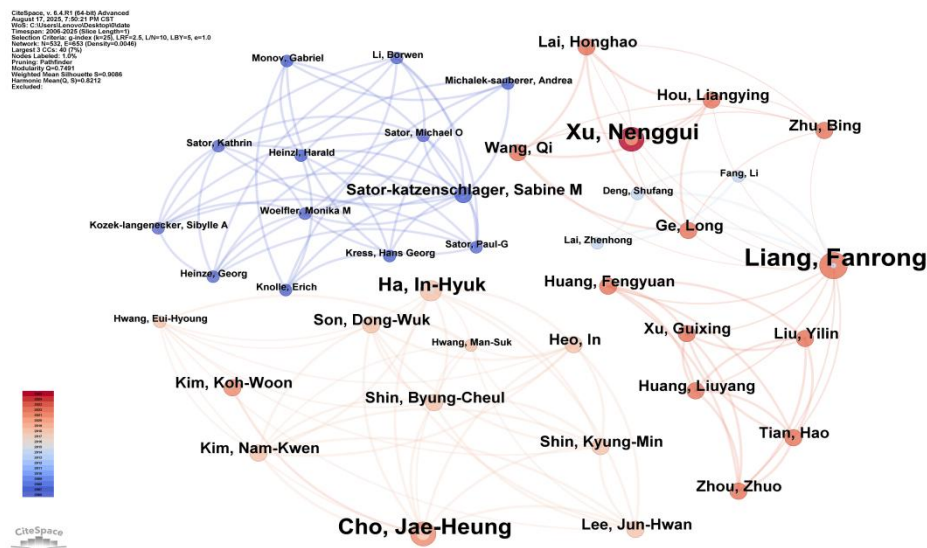


Figure 4. Distribution of Authors in Research Publications on Electroacupuncture for Pain Relief, 2006–2025.

Table 2. Frequency Statistics of High-Frequency Authors in Electroacupuncture for Pain Relief Research, 2006–2025.

Number	Frequency	Year	Author
1	8	2019	Zhao, Ling
2	7	2020	Fang, Jianqiao
3	6	2013	Zheng, Zhen
4	6	2020	Liang, Yi
5	5	2014	Liang, Fanrong
6	5	2013	Chen, Hao
7	5	2021	Sun, Mingsheng
8	4	2006	Ernst, E
9	4	2019	Chen, Lifang
10	4	2022	He, Kelin
11	4	2021	Fernandez-de-las-penas, Cesar

3.1.4. Keyword Cluster Timeline of Electroacupuncture Research in Pain Management (2006–2025)

This timeline spectrum integrates chronological progression with clustered tags, clearly illustrating the field's developmental rhythm. From 2006 to 2010, foundational groundwork was laid: systematic reviews consolidated scattered evidence, followed by clinical trials to validate the efficacy of “acupressure point stimulation”. From 2010 to 2020, after establishing efficacy, research shifted to identifying “where it can be applied”, translating acupoint stimulation into specific disease contexts while enhancing rigor through randomized controlled trials; From 2020 to 2025, application scenarios became increasingly specialized, with research progressing from “surface-level efficacy” toward “underlying mechanisms and precision interventions”. See Figure 5 for details.

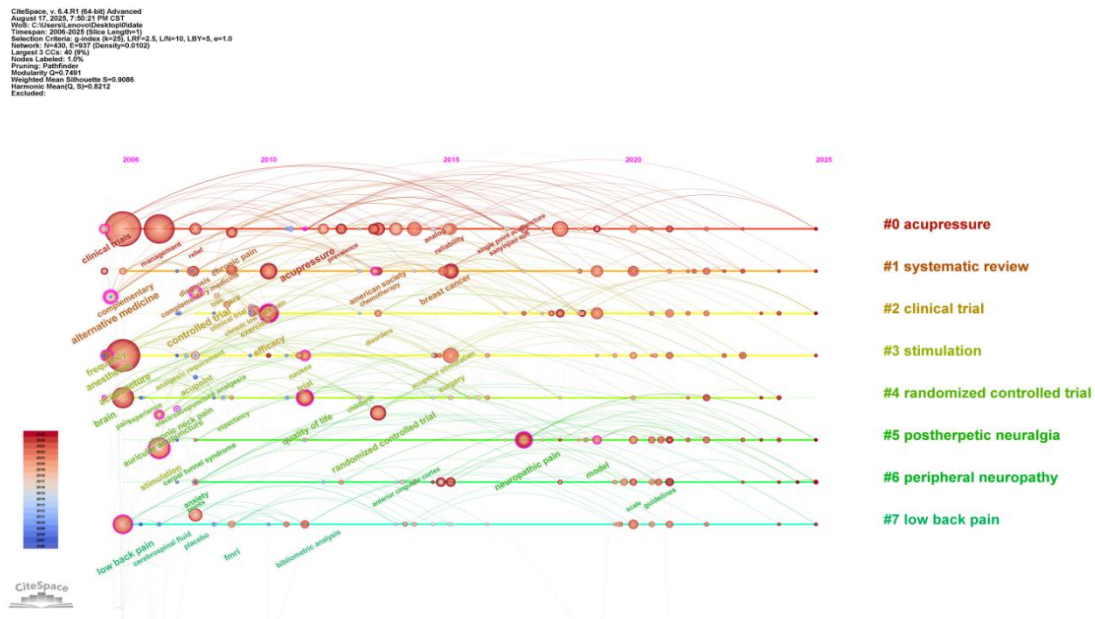


Figure 5. Timeline of Keyword Clustering for Research on Electroacupuncture Techniques in Pain Management, 2006–2025.

3.2. Google Trends Analysis Results

3.2.1. High-Frequency Keyword Extraction

This study selected six representative core terms from the high-frequency keywords identified in the bibliometric analysis: “acupuncture”, “electroacupuncture”, “low back pain”, “migraine”, “chronic pain”, and “postoperative pain”. Each core keyword is accompanied by relevant synonyms and related expressions, as detailed in Table 3.

Table 3. Core Keywords and Synonyms Table.

Keyword	Synonyms/Related Terms
acupuncture	traditional acupuncture, manual acupuncture
electroacupuncture	EA, electro-acupuncture, electric acupuncture, electroacupuncture therapy
low back pain	lumbar pain, lumbago, lower back pain
migraine	headache, migraine disorder
chronic pain	persistent pain, long-term pain
postoperative pain	post-surgery pain, surgical pain

3.2.2. Google Trends Comparison

Google Trends obtained global search popularity data from 2006 to 2025 and compared it with corresponding academic publication frequencies. After min–max normalization (range 0–100), annual trend curves were plotted, as shown in Figure 6.

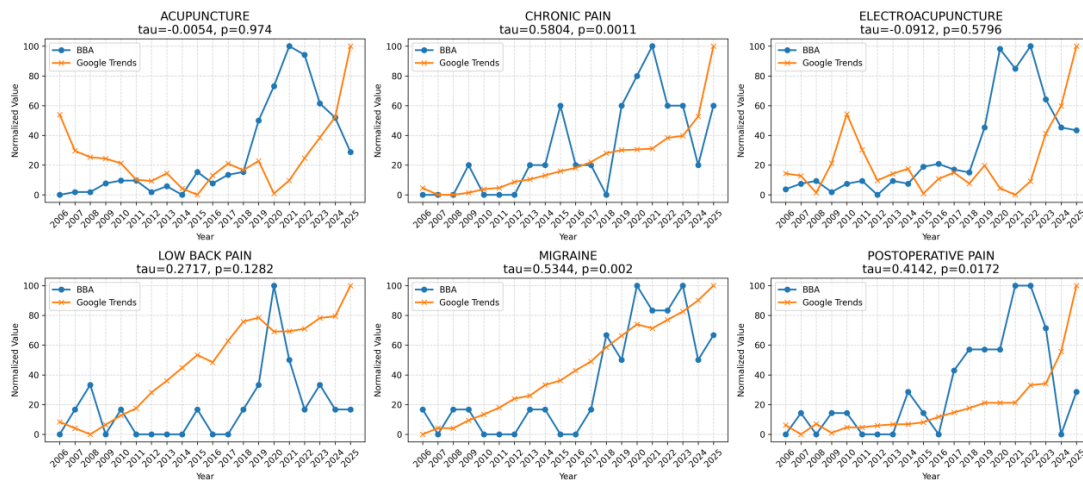


Figure 6. Annual Correlation of Keyword Frequency between Bibliometric Analysis and Google Trends.

Overall, “acupuncture” has consistently maintained high search volume among the public, though its trend exhibits significant fluctuations that do not fully align with changes in academic publications (BBA). In contrast, “electroacupuncture” has garnered relatively lower public attention with pronounced volatility and no discernible upward trajectory. Conversely, its academic publication volume (BBA) has demonstrated sustained growth since 2017, revealing a disparity where “academic interest outpaces public awareness”.

It is worth noting that since Google Trends primarily reflects global search interest (excluding mainland China), and significant academic output and clinical applications in the electroacupuncture field are concentrated in China, Google Trends data may not fully capture public interest in this area. This discrepancy could be one reason for the relatively low correlation between the two metrics.

Among disease-related keywords, Google search interest for “chronic pain” and “low back pain” has shown an overall upward trend, aligning with increasing public concern about these conditions. simultaneously, these two topics hold significant weight in academic research. Particularly for “chronic pain”, the trajectory of academic publications (BBA) aligns strongly with Google search trends (GT) in most years, indicating a robust correlation between scholarly inquiry and public interest in this domain. “Migraine” exhibits steady growth in both public attention and academic output. “Postoperative pain” exhibits relatively low and fluctuating public search interest, yet remains a significant research focus academically. Its academic publication volume increased markedly after 2016, suggesting its clinical value is not yet fully recognized by the public.

Correlation tests revealed moderate to high positive correlations between academic publication trends and public search trends for most keywords. Among them, “chronic pain” ($\tau = 0.5804, p < 0.01$) and “migraine” ($\tau = 0.5344, p < 0.01$) demonstrated statistically significant correlations. This indicates that in these fields, academic research hotspots can to some extent reflect public attention. However, keywords such as “electroacupuncture” ($\tau = -0.0912$) and “acupuncture” ($\tau = -0.0054$) showed weak or even negative correlations between academic trends and public interest, suggesting a gap between academic and public perceptions.

In summary, the integration of Google Trends with bibliometrics offers a valuable perspective for exploring the alignment between research hotspots and public interest. Overall, public attention toward acupuncture and pain-related conditions overlaps to some extent with academic research. However, in relatively specialized technical areas like “electroacupuncture”, academic research clearly leads the public discourse. This disparity suggests that future efforts in researching and promoting electroacupuncture for pain relief should prioritize public science communication and clinical translation.

4. Discussion

4.1. Current Research Status of Electroacupuncture in Pain Management

(1) Presentation Trends

From 2006 to 2025, the number of research publications on electroacupuncture in pain management showed an overall upward trend, with a significant acceleration after 2015, indicating growing academic attention to this technique [1,6]. Research themes primarily focus on the efficacy and mechanism of electroacupuncture in chronic pain, postoperative pain, and cancer pain [7,8]. Additionally, numerous studies explore parameter optimization, comparative efficacy, and synergistic effects with other therapies, reflecting the diversity and depth of research in

this field. However, publication volume rapidly declined after peaking in 2022, suggesting potential bottlenecks in mechanism exploration or the need for new theoretical breakthroughs [9].

(2) From an institutional perspective, research is highly concentrated in core regions with frequent and stable collaboration. Leading institutions include Chinese medicine universities and research centers such as Beijing University of Chinese Medicine, Chengdu University of Traditional Chinese Medicine, and Shanghai University of Traditional Chinese Medicine. This reflects China's leading position in electroacupuncture analgesia research and underscores the close connection between electroacupuncture technology and traditional Chinese medicine [10]. Peripheral regions exhibit significantly less academic interaction than core areas, with groups operating relatively independently, indicating substantial potential for collaboration [11].

(3) Author distribution reveals tight internal clustering with sparse inter-cluster cooperation, indicating multiple relatively independent research teams. Collaboration within teams is highly efficient, with some senior authors playing leading roles through deep academic foundations and long-term research commitment [12,13]. However, inter-team communication and collaboration require strengthening to promote resource sharing and the integration of research approaches.

(4) Regionally, mainland China dominates electroacupuncture analgesia research, with institutions like Beijing University of Chinese Medicine and Chengdu University of Traditional Chinese Medicine ranking high in publications, highlighting the significant contributions of TCM universities in this field [14,15]. Additionally, participation from international institutions such as Kyung Hee University in South Korea reflects the globalizing trend in electroacupuncture research. However, collaboration remains predominantly domestic, with limited international cooperation. Future efforts should prioritize cross-regional and interdisciplinary exchanges to advance research depth.

4.2. Research Hotspots and Trends in Electroacupuncture Analgesia

4.2.1. Research Hotspots

(1) Neurobiological mechanisms of electroacupuncture analgesia. This remains a core research focus. Recent research in electroacupuncture analgesia has increasingly focused on its multi-level, multi-target neurochemical and immunomodulatory mechanisms [16]. Specifically, electroacupuncture stimulation promotes the release of endogenous opioids such as β -endorphin and enkephalin within the central nervous system, activating μ and δ opioid receptors to inhibit pain transmission pathways [17]. Concurrently, electroacupuncture modulates serotonergic and noradrenergic systems, enhancing the activity of descending inhibitory pathways to further elevate pain thresholds. At the peripheral level, it significantly suppresses the expression of proinflammatory cytokines like TNF- α , IL-1 β , and IL-6, thereby reducing local inflammatory responses and blocking the generation and transmission of pain signals [18]. Recent research has expanded to include interventions targeting NMDA receptor-mediated central sensitization mechanisms, regulation of the endocannabinoid system, and modulation of astrocyte and microglial activation states, offering new perspectives on the multi-mechanistic synergistic analgesia of electroacupuncture [19,20].

(2) Optimization of acupoint selection and stimulation parameters. Studies indicate that different electrical frequencies activate distinct neurochemical pathways: Low-frequency electroacupuncture (2–10 Hz) more readily promotes the release of enkephalins and β -endorphins, making it suitable for chronic pain and emotion-related pain syndromes. In contrast, high-frequency electroacupuncture (50–100 Hz) tends to activate the enkephalin system and spinal noradrenergic pathways, demonstrating better efficacy for neuropathic pain and acute pain [21,22]. Furthermore, individualized point selection strategies based on Traditional Chinese Medicine (TCM) pattern differentiation are gaining prominence. This involves selecting meridian points according to the location, nature of pain, and patient constitution, thereby enhancing treatment specificity and efficacy.

(3) Combination of Electroacupuncture with Other Therapies. As a non-pharmacological intervention, electroacupuncture can synergistically enhance the effects of physical therapy, cognitive behavioral therapy, and medication, particularly for complex or refractory pain. In perioperative management, electroacupuncture is incorporated into multimodal analgesia protocols, effectively alleviating acute and chronic postoperative pain while reducing opioid dosage and associated adverse reactions, and lowering the risk of pain chronicity [23]. Furthermore, the combination of electroacupuncture with nonsteroidal anti-inflammatory drugs (NSAIDs) or low-dose opioids shows promising prospects in conditions such as cancer pain and fibromyalgia [24].

4.2.2. Research Trends

(1) Keyword clustering timelines reveal distinct developmental phases. The foundational period (2006–2010) integrated evidence through systematic reviews and validated clinical trials, laying groundwork for subsequent research. The application expansion phase (2010–2020) extended electroacupuncture analgesia to specific disease contexts while increasing randomized controlled trials to enhance research rigor. The 2020–2025 period represents a phase of specialized deepening, with research delving into underlying mechanisms and precision interventions. This marks a transition toward mechanism visualization and personalized treatment, reflecting a developmental trajectory from fundamental to applied research and from broad to targeted approaches [25,26].

(2) Google Trends analysis reveals that among disease-related keywords, academic publication trends for “chronic pain” and “migraine” show significant correlation with public search trends, indicating alignment between research focus and public interest in these areas. Conversely, academic interest in ‘electroacupuncture’ diverges markedly from public awareness, while the clinical value of “postoperative pain” remains underappreciated by the public, highlighting a gap between academic research and public perception.

4.3. Future Prospects for Electroacupuncture in Pain Management

(1) Future Research Trends. Future studies should strengthen scientific collaboration across research teams and regions, breaking away from the current relatively isolated model characterized by tight intra-cluster cooperation and sparse inter-cluster engagement. This requires fostering research alliances that span institutions, geographical boundaries, and even disciplines. By sharing data resources and standardizing research methodologies and evaluation criteria, duplicate studies can be effectively avoided, enhancing research efficiency and quality. This approach will promote systematic and holistic development in the field of electroacupuncture analgesia.

(2) Strengthening Scientific Communication. Addressing the gap between academic understanding and public awareness regarding “electroacupuncture” and “postoperative pain”, efforts should be intensified in scientific communication and public education. Utilizing diverse channels such as popular science articles, health lectures, social media platforms, and clinical consultations, the mechanisms, efficacy, and safety of electroacupuncture analgesia can be systematically introduced to the public. This will enhance societal understanding and trust in the technology, thereby increasing its clinical acceptance and application rates.

(3) Integrate intelligent technologies. Research on the mechanisms of electroacupuncture analgesia has entered an advanced stage. The rapid development of emerging technologies like artificial intelligence, big data, and the Internet of Things has injected new vitality into this field [27]. Future efforts should focus on developing multi-center clinical big data-driven intelligent decision-making systems for electroacupuncture analgesia. This involves integrating cases from multiple institutions to analyze treatment patterns and optimize strategies. Concurrently, intelligent electroacupuncture devices with biofeedback regulation capabilities should be developed to monitor physiological signals in real time and automatically optimize parameters, thereby enhancing efficacy, safety, and patient experience. Currently, domestic smart healthcare resources predominantly focus on geriatric care and similar fields, leaving the intelligent exploration of electroacupuncture analgesia underdeveloped. Existing electronic information systems only support basic management, failing to achieve deep mining and intelligent analysis of electroacupuncture big data. This hinders decision support, limiting the promotion and value realization of electroacupuncture analgesia.

In summary, this paper utilizes the Web of Science core database as its literature source and employs software such as CiteSpace, Bibliometrix, and Google Trends to comprehensively present the current research status, hot trends, and existing conditions of electroacupuncture technology in the field of analgesia. Publication volume in this field showed an overall upward trend from 2006 to 2025, with a significant acceleration after 2015, peaking in 2022 before declining. Research topics are diverse, covering applications across various types of pain and their mechanisms. Current research hotspots primarily focus on the neurobiological mechanisms of electroacupuncture analgesia, optimization of acupoints and stimulation parameters, and combined applications. Research development exhibits phased characteristics, with a gap existing between academic recognition and public awareness. Development remains uneven across research institutions, authors, and regions. Collaboration is predominantly confined to core teams or within domestic institutions, with limited cross-team, cross-regional, and international cooperation. Future research should prioritize enhanced collaboration among teams and regions, alongside strengthening science communication to bridge the knowledge gap. Furthermore, integrating electroacupuncture analgesia with intelligent technologies is essential to overcome research bottlenecks, better align the technique with clinical needs, and enhance its practical value.

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Conflicts of Interest

The authors declare no conflict of interest.

Reference

1. Sun JL, Lyu N. Research Progress on the Mechanisms of Electroacupuncture Analgesia in Neuropathic Pain. *Fudan University Journal of Medical Sciences* 2021; **48**(3): 398–403.
2. Erasmus S, Lyu Z, Zhou J, et al. Electroacupuncture Mechanisms in Managing Preoperative Anxiety and Postoperative Pain Chronification: A Review. *Journal of Pain Research* 2024; **17**: 4089–4100.
3. Chen H, Feng G, Zhao Y. Progress of Electrical Stimulation to Promote Peripheral Nerve Regeneration. *Journal of Clinical Otorhinolaryngology Head and Neck Surgery* 2024; **38**(5): 411–415.
4. Zhang J, Wu W, Ren Y, et al. Electroacupuncture for the Treatment of Cancer Pain: A Systematic Review and Meta-Analysis of Randomized Clinical Trials. *Frontiers in Pain Research* 2023; **4**: 1186506.
5. Chen H, Feng G, Zhao Y. Clinical Study on the Application of Electroacupuncture in Otorhinolaryngology Diseases. *Journal of Clinical Otorhinolaryngology Head and Neck Surgery* 2024; **38**(5): 411–420.
6. Chao X, Yuan T, Ruting S, et al. Therapeutic Effect of Myofascial Trigger Point Electroacupuncture Technology on the Treatment of Overactive Bladder Syndrome in Female. *Journal of Central South University Medical Sciences* 2020; **45**(2): 155–159.
7. Ökmen K, Balk Ş, Güvenç GG. The Effect of Different Regional Analgesia Methods on Chronic Pain after Thoracic Surgery. *Polish Journal of Cardio-Thoracic Surgery* 2023; **20**(4): 233–239.
8. Akben S, Tuncel G, Argun G, et al. Efficiency of the Local Infiltration Analgesia Method in Total Knee Arthroplasty Surgeries. *Acta Chirurgiae Orthopaedicae et Traumatologiae Cechoslovaca* 2023; **90**(6): 416–421.
9. Orenga HC, Galiana L, Sansó N, et al. Effects of Water Immersion Versus Epidural as Analgesic Methods during Labor among Low-Risk Women: A 10-Year Retrospective Cohort Study. *Healthcare* 2024; **12**(19): 1919.
10. Huang H, Liang Y, Han D, et al. Case Report: Electroacupuncture for Acute Pain Flare-Up of Knee Osteoarthritis. *Frontiers in Neurology* 2022; **13**: 1026441.
11. Hsu CY, Yin BY, Ethan CYL. Remodeling Effects of the Combination of GGT Scaffolds, Percutaneous Electrical Stimulation, and Acupuncture on Large Bone Defects in Rats. *Frontiers in Bioengineering and Biotechnology* 2022; **10**: 832808.
12. Huang SR, Pan LD, Ma YW, et al. Research on Community Promotion and Application of Single Acupoint Electroacupuncture Therapy for Lumbar Intervertebral Disc Herniation. *Chinese Acupuncture & Moxibustion* 2021; **41**(4): 391–394.
13. Marchand JG, Masoud A, Grover S, et al. First and Second-Generation Endometrial Ablation Devices: A Network Meta-Analysis. *BMJ Open* 2024; **14**(5): e065966.
14. Hay DI, Lee AR, Reading CC, et al. Can Ethanol Ablation Achieve Durable Control of Neck Nodal Recurrences in Adults with Stage I Papillary Thyroid Cancer? *Journal of the Endocrine Society* 2024; **8**(5): bvae037.
15. Zhang MH, Li FJ, Zhao WJ, et al. The Involvement of the Ventral Tegmental Area in the Electroacupuncture Alleviation of Anxiety-Like Behaviors Induced by Chronic Restraint Stress in Mice. *Neurochemical Research* 2024; **49**(11): 1–12.
16. Sun J, Liang Y, Luo TK, et al. Efficacy of Different Acupuncture Techniques for Pain and Dysfunction in Patients with Knee Osteoarthritis: A Randomized Controlled Trial. *Pain and Therapy* 2025; **14**(2): 737–751.
17. Antonucci M, Passarini E, Bruno E, et al. Clinical Study on the Application of Acupuncture in the Postoperative Rehabilitation of Dogs Affected by Acute Thoracolumbar Disc Herniation. *Animals* 2025; **15**(8): 1154.
18. Rodrigues JM, Ventura C, Abreu M, et al. Electro-Acupuncture Effects Measured by Functional Magnetic Resonance Imaging: A Systematic Review of Randomized Clinical Trials. *Healthcare* 2023; **12**(1): 2. <https://doi.org/10.3390/healthcare12010002>.

19. Nambi G, Alrawaili MS. An Additional Effect of Electro-Acupuncture on Unspecified Chronic Low Back Pain among University Employees in Al-Kharj, Saudi Arabia: A Randomized Controlled Study. *Acupuncture & Electro-Therapeutics Research* 2023; **48**(3): 185–197.
20. Biyang F, Yuanyuan S, Lei L, *et al.* Transcutaneous Electrical Acupuncture Point Stimulation Is Cardioprotective for Patients with Stable Ischemic Heart Disease. *The American Journal of Cardiology* 2023; **206**: 202–209.
21. Wang L, Xu T, Sun M, *et al.* Electro-Acupuncture for Gastrointestinal Dysfunction after Colorectal Cancer Surgery: A Protocol for Three-Arm Randomized Controlled Trial. *European Journal of Integrative Medicine* 2023; **62**: 102277. <https://doi.org/10.1016/j.eujim.2023.102277>.
22. Hassan AT, Jia JL, YongT. Peripheral and Spinal Mechanisms Involved in Electro-Acupuncture Therapy for Visceral Hypersensitivity. *Frontiers in Neuroscience* 2021; **15**: 696843.
23. Mingmin X, Lu W, Yu G, *et al.* Corrigendum to “Positive Effect of Electro-Acupuncture Treatment on Gut Motility in Constipated Mice Is Related to Rebalancing the Gut Microbiota”. *Evidence-Based Complementary and Alternative Medicine* 2021; **2021**: 9835654.
24. Chen X, Wu M, Li J. Electroacupuncture Therapy for Acute Gastrointestinal Injury: Review and Perspectives. *Acupuncture in Medicine: Journal of the British Medical Acupuncture Society* 2021; **39**(5): 567–568. <https://doi.org/10.1177/0964528421989714>.
25. Wu Y, Hu R, Zhong X, *et al.* Electric Acupuncture Treatment Promotes Angiogenesis in Rats with Middle Cerebral Artery Occlusion through EphB4/EphrinB2 Mediated Src/PI3K Signal Pathway. *Journal of Stroke and Cerebrovascular Diseases* 2021; **30**(3): 105165. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105165>.
26. Ying H, Manshu Y, Akihiro K, *et al.* Downregulation of Let-7 by Electrical Acupuncture Increases Protein Synthesis in Mice. *Frontiers in Physiology* 2021; **12**: 697139.
27. Işık İ, Çevik C. Meta-Analysis of the Effectiveness of Acupuncture Treatment in Shoulder Pain. *Journal of Medical and Health Studies* 2024; **5**(4): 175–190.