Acupuncture and Herbal Medicine

World's top 50 high-impact research studies in traditional medicine in 2024

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Introduction

To promote the preservation, innovation, and development of traditional Chinese medicine (TCM) and facilitate the global sharing of modern research achievements in TCM, the editorial board of *Acupuncture and Herbal Medicine* (*AHM*) selected high-impact articles in the field of TCM, ethnopharmacology, and acupuncture on 2023. This year's selection was jointly organized by the Tianjin University of Traditional Chinese Medicine, Institute of Scientific and Technical Information of China, China Association of Traditional Chinese Medicine, and Wolters Kluwer. Following a rigorous evaluation process, The World Top 50 High-Impact Research of Traditional Medicine," published in 2022, was unveiled at the opening ceremony of the third High-Quality Development Conference of Traditional Chinese Medicine on April 10, 2024. This initiative aimed to promote international cooperation and exchange and commercialization of scientific and technological achievements.

Summary of the "Top 50 High-Impact Research Studies on Traditional Medicine"

The selection was across five dimensions: journal influence, article influence, author influence, public influence, and academic influence. These studies were selected based on indexing in databases, expert recommendations, and self-nominations. The final selection process included multiple stages, including on-line public voting, peer expert voting, and expert consensus. Through a comprehensive evaluation, a total of 50 research studies were ultimately selected (Table 1).

The 50 high-impact research articles covered several fields including clinical (10), pharmacological (14), pharmaceutical (8), phytochemical/biosynthesis (12), and herbal medicine resource (6) research. Among them, 37 were independently conducted by Chinese researchers, 10 by international collaborations led by China involving entities from the US, France, South Korea, the UK, and Ireland, and three by international researchers from Germany, Canada, the UK, and the US (Figure 1).

The studies were published across 27 journals, including renowned publications such as *Jama Network Open*, *Acta Pharmaceutica Sinica B*, *Nature Communications*, *Pharmacological Research*, and *Acta Pharmacologica Sinica*. The most impactful journal had an impact factor of 39.3, and the average impact factor across all journals was 11. As of April 27, 2024, the 50 high-impact research articles reached a total of 1,137 citations, with an average of 22.74 citations per article. The study with the highest citation count, published in *Nature Biomedical Engineering*, received 110 citations and had an impact factor of 28.1. This study identified mitochondrial autophagy inducers through machine learning and cross-species workflows, offers a novel approach to ameliorate Alzheimer's disease pathology[33]. Figure 2 shows the high-frequency keywords among the selected articles.

Implications and perspectives

The top 50 high-impact studies collectively reflect the prevailing trends in traditional medicine research over recent years. The increasing use of advanced technologies, focus on chronic diseases and aging, interdisciplinary collaboration, and global collaboration have driven this field forward. A notable trend is the use of advanced technologies, such as genomics, proteomics, and metabolomics, in pharmacological and pharmaceutical research, alongside the application of artificial intelligence in drug discovery. Many studies have focused on TCM and natural products exploring their pharmacological effects, active ingredients, and mechanisms of action. This trend highlights the increasing interest in and recognition of TCM and natural products in global medical research. Moreover, a significant portion of this research addresses chronic diseases, such as Crohn disease, depression, type 2 diabetes, and Alzheimer disease. Additionally, exploring the potential of TCM ingredients for anti-aging and

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Table 1

Summary of the top 50 high-impact research articles of traditional medicine in 2024

No.	Research area	Title	Journal	Author
1	Clinical research	Acupuncture improves the symptoms, intestinal microbiota, and inflammation of patients with mild to moderate Crohn's disease: a randomized controlled trial	*eClinicalMedicine*	Bao et al.[1]
2	Clinical research	Effect of electroacupuncture on insomnia in patients with depression: a randomized clinical trial	*JAMA Network Open*	Yin et al.[2]
3	Clinical research	Effectiveness of acupuncture for anxiety among patients with Parkinson disease: a randomized clinical trial	*JAMA Network Open*	Fan et al.[3]
4	Clinical research	Efficacy of combined abelmoschus manihot and irbesartan for reduction of albuminuria in patients with type 2 diabetes and diabetic kidney disease: a multicenter randomized double-blind parallel controlled clinical trial	*Diabetes Care*	Zhao et al.[4]
5	Clinical research	Effect of acupoint hot compress on postpartum urinary retention after vaginal delivery: a randomized clinical trial	*JAMA Network Open*	Zhu et al.[5]
6	Clinical research	Effectiveness of acupuncture for pain control after cesarean delivery a randomized clinical trial	*JAMA Network Open*	Usichenko et al.[6]
7	Clinical research	Entecavir plus Biejia-Ruangan compound reduces the risk of hepatocellular carcinoma in Chinese patients with chronic hepatitis	*Journal of Hepatology*	Ji et al.[7]
8	Clinical research	Effects of electroacupuncture for opioid-induced constipation in patients with cancer in China: a randomized clinical trial	*JAMA Network Open*	Wang et al.[8]
9	Clinical research	Comparison of acupuncture vs sham acupuncture or waiting list control in the treatment of aromatase inhibitor-related joint pain: a randomized clinical trial	*JAMA Network Open*	Hershman et al.[9]
10	Clinical research	Acupuncture for patients with chronic tension-type headache: a randomized controlled trial	*Neurology*	Zheng et al.[10]
11	Pharmacological research	Solamargine induces hepatocellular carcinoma cell apoptosis and autophagy *via* inhibiting LIF/miR-192-5p/CYR61/Akt signaling pathways and eliciting immunostimulatory tumor microenvironment	*Journal of Hematology & Oncology*	Yin et al.[11]
12	Pharmacological research	Xuanfei Baidu Decoction reduces acute lung injury by regulating infiltration of neutrophils and macrophages *via* PD-1/IL17A pathway	*Pharmacological Research*	Wang et al.[12]
13	Pharmacological research	Bruceine A protects against diabetic kidney disease *via* inhibiting galectin-1	*Kidney International*	Li et al.[13]
14	Pharmacological research	The flavonoid corylin exhibits lifespan extension properties in mouse	*Nature Communications*	Wang et al.[14]
15	Pharmacological research	Elucidation of the anti-inflammatory mechanism of Er Miao San by integrative approach of network pharmacology and experimental verification	*Pharmacological Research*	Guo et al.[15]
16	Pharmacological research	Morinda officinalis oligosaccharides increase serotonin in the brain and ameliorate depression *via* promoting 5-hydroxytryptophan production in the gut microbiota	*Acta Pharmaceutica Sinica B*	Zhang et al.[16]
17	Phytochemical research	Chemical screen identifies shikonin as a broad DNA damage response inhibitor that enhances chemotherapy through inhibiting ATM and ATR	*Acta Pharmaceutica Sinica B*	Wang et al.[17]
18	Pharmacological research	Xuanfei Baidu formula alleviates impaired mitochondrial dynamics and activated NLRP3 inflammasome by repressing NF-kappa B and MAPK pathways in LPS-induced ALI and inflammation models	*Phytomedicine*	Li et al.[18]
19	Pharmacological research	Schisandrol A protects AGEs-induced neuronal cells death by allosterically targeting ATP6V0d1 subunit of V-ATPase	*Acta Pharmaceutica Sinica B*	Zhou et al.[19]
20	Pharmacological research	Main active components of Si-Miao-Yong-An decoction (SMYAD) attenuate autophagy and apoptosis *via* the PDE5A-AKT and TLR4-NOX4 pathways in isoproterenol (ISO)-induced heart failure models	*Pharmacological Research*	Liao et al.[20]
21	Pharmacological research	Traditional Patchouli essential oil modulates the host's immune responses and gut microbiota and exhibits potent anti-cancer effects in Apc(Min/+)mice	*Pharmacological Research*	Leong et al.[21]

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Table 1

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No.	Research area	Title	Journal	Author
22	Pharmacological research	Qing-Xin-Jie-Yu Granule alleviates atherosclerosis by reshaping gut microbiota and metabolic homeostasis of ApoE-/- mice	*Phytomedicine*	Wang et al.[22]
23	Pharmacological research	Tetramethylpyrazine prevents liver fifibrotic injury in mice by targeting hepatocyte-derived and mitochondrial DNA-enriched extracellular vesicles	*Acta Pharmacologica Sinica*	Li et al.[23]
24	Pharmacological research	Ginsenoside Rb1 alleviates diabetic kidney podocyte injury by inhibiting aldose reductase activity	*Acta Pharmacologica Sinica*	He et al.[24]
25	Pharmaceutical preparation research	Tripterin liposome relieves severe acute respiratory syndrome as a potent COVID-19 treatment	*Signal Transduction and Targeted Therapy*	Que et al.[25]
26	Pharmaceutical preparation research	Transporting Hydrogel *via* Chinese Acupuncture Needles for Lesion Positioning Therapy	*Advanced Science*	Lin et al.[26]
27	Pharmaceutical preparation research	A cyclodextrin-based nanoformulation achieves co-delivery of ginsenoside Rg3 and quercetin for chemo-immunotherapy in colorectal cancer	*Acta Pharmaceutica Sinica B*	Sun et al.[27]
28	Pharmaceutical preparation research	Sequential gastrodin release PU/n-HA composite scaffolds reprogram macrophages for improved osteogenesis and angiogenesis	*Bioactive Materials*	Li et al.[28]
29	Pharmaceutical research	Salvianolic acid B dry powder inhaler for the treatment of idiopathic pulmonary fibrosis	*Asian Journal of Pharmaceutical Sciences*	Lu et al.[29]
30	Pharmaceutical research	Oral administration of turmeric-derived exosome-like nanovesicles with anti-inflammatory and pro-resolving bioactions for murine colitis therapy	*Journal of Nanobiotechnology*	Liu et al.[30]
31	Pharmaceutical research	Gastrodin modified polyurethane conduit promotes nerve repair *via* optimizing Schwann cells function	*Bioactive Materials*	Yang et al.[31]
32	Pharmaceutical research	Mitochondria-targeted polymer-celastrol conjugate with enhanced anti-cancer efficacy	*Journal of Controlled Release*	Geng et al.[32]
33	Phytochemical/ biosynthesis research	Amelioration of Alzheimer's disease pathology by mitophagy inducers identified *via* machine learning and a cross-species workflow	*Nature Biomedical Engineering*	Xie et al.[33]
34	Phytochemical/ biosynthesis research	Functional characterization and protein engineering of a triterpene 3-/6-/2'-O-glycosyltransferase reveal a conserved residue critical for the regiospecificity	*Angewandte Chemie International Edition*	Zhang et al.[34]
35	Phytochemical/ biosynthesis research	A pyridine dearomatization approach to the matrine-type lupin alkaloids	*Journal of the American Chemical Society*	Kerkovius et al.[35]
36	Phytochemical/ biosynthesis research	Tripterygium wilfordii cytochrome P450s catalyze the methyl shift and epoxidations in the biosynthesis of triptonide	*Nature Communications*	Hansen et al.[36]
37	Phytochemical/ biosynthesis research	Regeneration of phytochemicals by structure-driven organization of microbial biosynthetic steps	*Angewandte Chemie International Edition*	Wu et al.[37]
38	Phytochemical/ biosynthesis research	Asymmetric total synthesis of (-)-phaeocaulisin A	*Journal of the American Chemical Society*	Péter et al.[38]
39	Phytochemical/ biosynthesis research	A heme-activatable probe and its application in the high-throughput screening of Plasmodium falciparum ring-stage inhibitors	*Signal Transduction and Targeted Therapy*	Liu et al.[39]
40	Phytochemical/ biosynthesis research	Rationally engineering santalene synthase to readjust the component ratio of sandalwood oil	*Nature Communications*	Zha et al.[40]

(*Continued*)

Table 1

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No.	Research area	Title	Journal	Author
41	Phytochemical/ biosynthesis research	Glycoside-specific metabolomics combined with precursor isotopic labeling for characterizing plant glycosyltransferases	*Molecular Plant*	Wu et al.[41]
42	Phytochemical/ biosynthesis research	Multi-omics profiling reveals comprehensive microbe-plant-metabolite regulation patterns for medicinal plant Glycyrrhiza uralensis Fisch	*Plant Biotechnology Journal*	Zhong et al.[42]
43	Phytochemical/ biosynthesis research	SmbHLH60 and SmMYC2 antagonistically regulate phenolic acids and anthocyanins biosynthesis in Salvia miltiorrhiza	*Journal of Advanced Research*	Liu et al.[43]
44	Phytochemical/ biosynthesis research	A novel hybrid scan approach enabling the ion-mobility separation and the alternate data-dependent and data-independent acquisitions (HDDIDDA): Its combination with off-line two-dimensional liquid chromatography for comprehensively characterizing the multicomponents from Compound Danshen Dripping Pill	*Analytica Chimica Acta*	Wang et al.[44]
45	Resource research	Allele-aware chromosome-level genome assembly of Artemisia annua reveals the correlation between ADS expansion and artemisinin yield	*Molecular Plant*	Liao et al.[45]
46	Resource research	Chromosome-level and haplotype-resolved genome provides insight into the tetraploid hybrid origin of patchouli	*Nature Communications*	Shen et al.[46]
47	Resource research	The transcription factors TLR1 and TLR2 negatively regulate trichome density and artemisinin levels in Artemisia annua	*Journal of Integrative Plant Biology*	Lv et al.[47]
48	Resource research	Molecular insights into AabZIP1-mediated regulation on artemisinin biosynthesis and drought tolerance in Artemisia annua	*Acta Pharmaceutica Sinica B*	Shu et al.[48]
49	Resource research	Quantitative comparison and chemical profile analysis of different medicinal parts of Perilla frutescens (L	*Journal of Agricultural and Food Chemistry*	Fan et al.[49]
50	Resource research	Plastid genome data provide new insights into the phylogeny and evolution of the genus Epimedium	*Journal of Advanced Research*	Guo et al.[50]

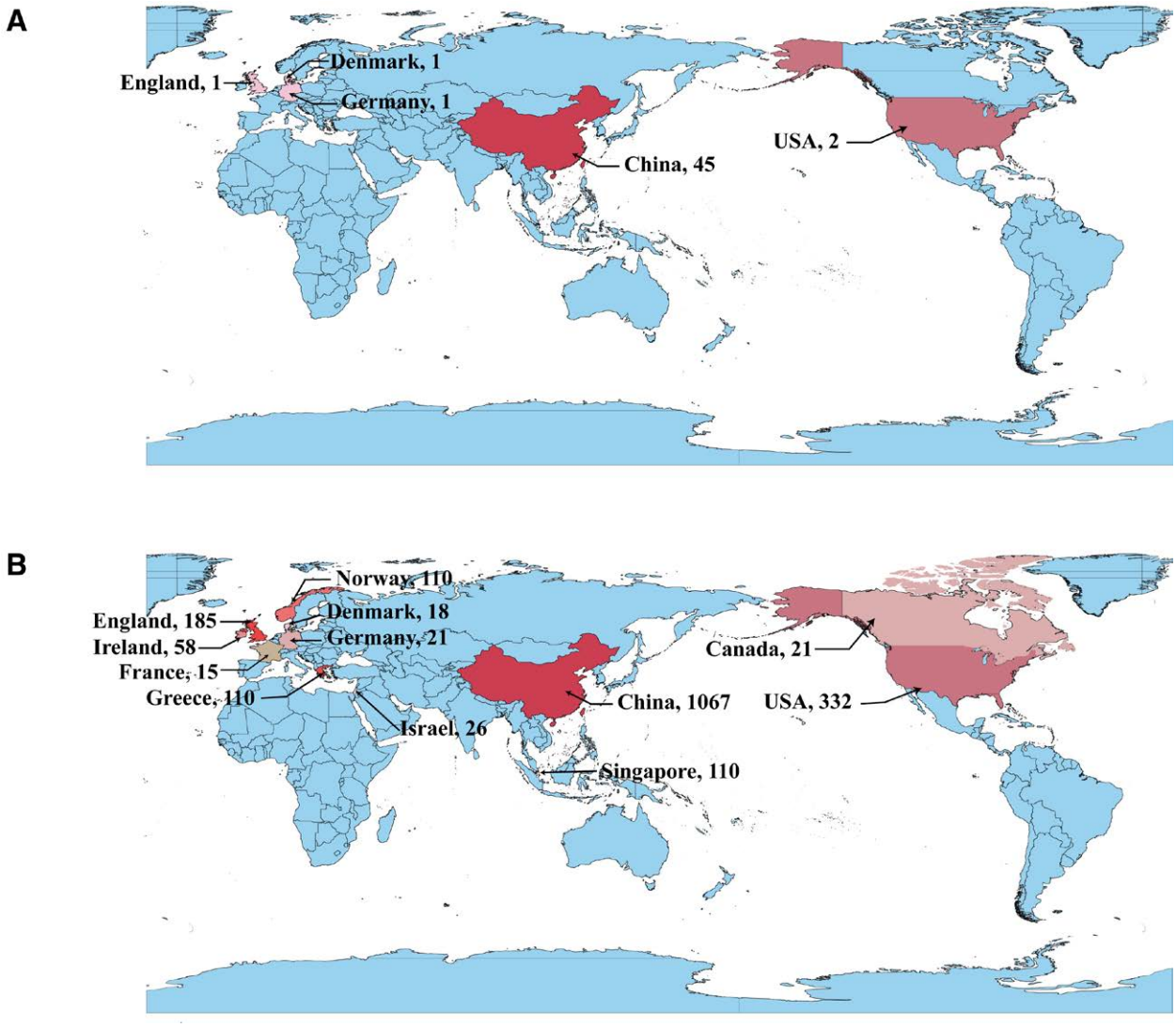

Figure 1. Summary of the characteristics of the top 50 high-impact research articles. (A) Distribution of the countries that conducted the research reported in the top 50 high-impact research articles; (B) maps of the countries citing the top 50 high-impact research articles (citations >10 until April 27, 2024).

lifespan extension. These trends are expected to continue to shape future TCM research and contribute to global health and well-being.

The "Top 50 High Impact Research in Traditional Medicine" has been selected for two consecutive years through the use of objective indicators and a rigorous selection process[51]. The selected studies demonstrate a notable academic impact and substantial academic value both domestically and globally, representing the highest level of scholarly achievement in the realm of traditional medicine. These efforts not only present the latest and most valuable scientific discoveries in the field of traditional medicine but also enhance public awareness and trust. We aspire for more researchers and experts to join us and commit to advancing the modernization of traditional medicine by consistently publishing academic studies with a significant impact.

Conflict of interest statement

Junhua Zhang is an editorial board member of this journal. None of the other authors declare any conflicts of interest.

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Author contributions

Bo Pang, Yibing Chen, Shuo Wang are the main drafters of the manuscript. Daiqing Yang, and Zhenglu Yu provide data support. Junhua Zhang and Yu She conceived the manuscript idea and revised and provided the critical version of the manuscript. All authors contributed to the revision of the manuscript and approved the final manuscript.

Ethical approval of studies and informed consent

Not applicable.

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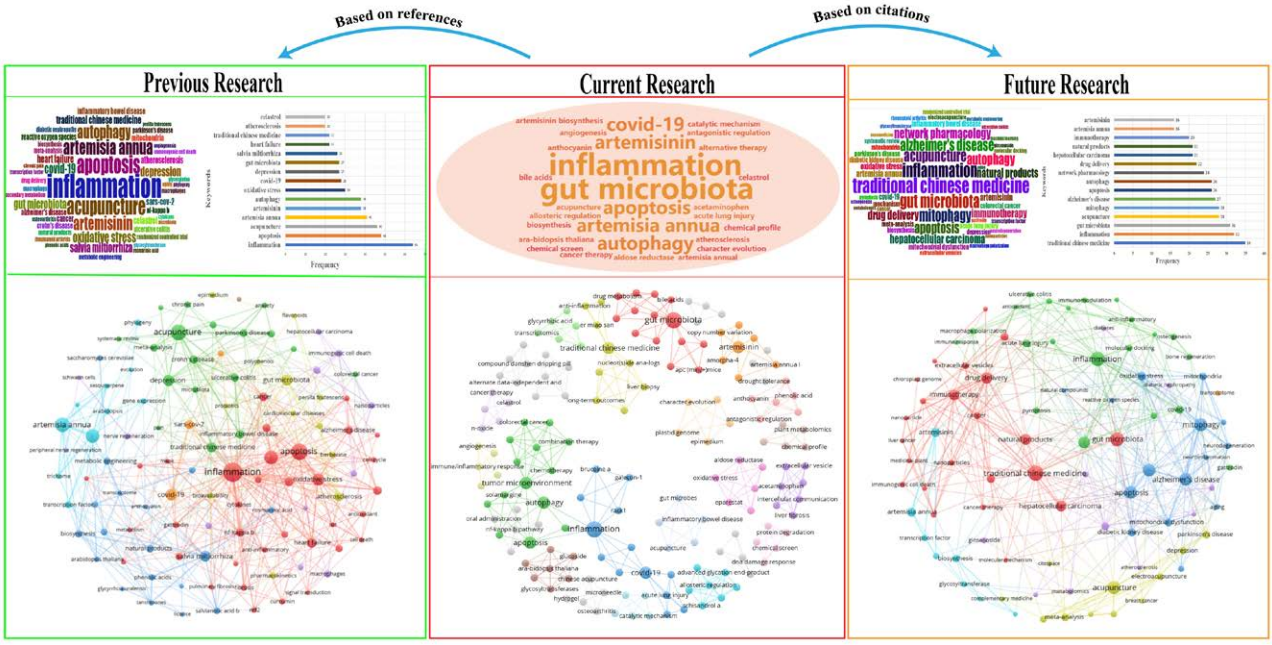

Figure 2. Visualization map generated using high-frequency keywords from the references and citations of the top 50 high-impact research articles. The images were made by Citespace 6.3.R1 software.

Data availability

All data generated or analyzed during this study are included in this published article.

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