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Mapping the research trend of traditional Chinese medicine in asthma, allergies, and infertility diseases from 2014 to 2023

Rima Hazarika
K. G. Sudhier

Traditional Chinese Medicine (TCM) has been an integral part of China's healthcare system for centuries and is increasingly recognized worldwide. This study presents a scientometric analysis of 12,059 publications (2014–2023) indexed in Dimensions.ai, focusing on TCM's role in treating asthma, allergies, and infertility. Using Biblioshiny, VOSviewer, and citation metrics, the analysis identifies key research trends, prolific authors, leading journals, and international collaborations. Results highlight China's dominance in output, growing global interest, and notable gaps in molecular mechanism studies. The findings provide valuable insights for researchers and policymakers, highlighting the need for standardization and enhanced international collaboration.

Keywords: *Traditional Chinese medicine, Asthma, Allergies, Infertility, Scientometric analysis, Dimensions.*

Rima Hazarika *
K. G. Sudhier †
Department of Library and Information Science
Central University of Tamil Nadu
Thiruvarur
Tamil Nadu
India

ORCID-ID
* 0000-0002-8025-8436
† 0000-0001-5212-2868

E-mail
* rimahazarika123@gmail.com
† kgsudhier@cutn.ac.in

* (Corresponding Author)

1. Introduction

In the vast landscape of global healthcare, China is unique in that Western and Traditional Medicine are practiced alongside each other at every level of the healthcare system [1]. Originating over 2000 years ago in ancient China, Traditional Chinese Medicine (TCM) has recently gained popularity worldwide, particularly in various Asian countries where it remains a significant component of healthcare services [2, 3]. TCM is a holistic approach that encompasses not only herbal Medicine but

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also physical methods such as acupuncture, cupping, and massage, all of which contribute to its therapeutic effects [4, 6]. It is essential to clarify that while this review focuses predominantly on herbal Medicine, the physical methods are integral to the overall practice of TCM and contribute to its efficacy in treating various conditions.

Despite the comprehensive nature of TCM, there is a lack of international standards to test the efficacy of interventions and monitor safety, particularly compared to Western medical practices [7]. In recent years, traditional Medicine has emerged as a global phenomenon, driven by patient demand for more personalized and holistic healthcare [5]. For many individuals, particularly those in remote or underserved areas, traditional Medicine remains their primary healthcare option due to its cultural relevance, accessibility, and affordability [8]. Within the governmental structure of China, TCM has a dedicated department at the Ministry of Public Health, alongside its presence in provincial and county Bureaus of Public Health [1]. Moreover, it boasts medical schools, hospitals, and research institutes, reflecting its entrenched status within the nation's healthcare framework.

The motivation for conducting this literature research extends beyond merely observing limited existing studies. Exploring TCM's role in treating chronic conditions such as asthma, allergies, and infertility is critical not only because of the absence of extensive research but also due to the significant potential of TCM to offer alternative or complementary therapeutic options. These conditions pose substantial challenges to global public health. TCM's holistic approach could provide valuable insights and treatments that may improve patient outcomes and contribute to a more comprehensive healthcare strategy.

A scientometric analysis offers a comprehensive overview of research publications focusing on TCM interventions for asthma, allergies, and infertility diseases. It is a quantitative study of scientific literature and its impact, yielding valuable insights into research trends, patterns, and evolution within a specific field [9]. Scientometric mapping comprises a set of visualization techniques developed in scientometrics for measuring science, technology, and innovation activity and outcomes [10]. Scientometrics has been defined as "the study of the quantitative aspects of science as a discipline or economic activity. It is part of the sociology of science and has application to science policy-making. It involves quantitative studies of scientific activities, including, among others, publication, and so overlaps bibliometrics to some extent" [11].

By examining the publication landscape within Dimensions.ai, an expansive research database, this study identifies key themes, influential authors, prominent journals, and the geographical distribution of research output in this domain. The primary aim of this study is to delineate the landscape of TCM research concerning asthma, allergies, and infertility diseases, with a particular emphasis on identifying trends, addressing gaps, and highlighting emerging areas of interest. By synthesizing and analyzing the existing body of literature, it aims to provide researchers, clinicians, and policymakers with valuable insights into the current state of TCM research in these areas and potential avenues for future investigation and collaboration. Ultimately, the overarching goal is to contribute to advancing evidence-based practice and integrating TCM into mainstream healthcare paradigms to benefit patients worldwide.

TCM encompasses various subjects and has attracted global attention. Existing studies have covered diverse topics, but asthma, allergies, and infertility remain relatively unexplored. Research has focused on diverse areas, including COVID-19 treatment [12, 13], heart failure [14], marine TCM [15], public health emergencies [16], lymphoma treatment [17], smoking cessation [18], cancer research [19], and nanoparticle formulations [20]. Bibliometric analyses reveal a surge in TCM-related publications worldwide, with China leading in production [21]. These studies reveal publication patterns, hotspots, and emerging trends, highlighting the increasing global interest and the need for deeper exploration of TCM's molecular mechanisms [22]. While significant strides have been made, challenges such as limited international collaboration and gaps in understanding the mechanisms of TCM highlight avenues for future research to enhance its integration into mainstream healthcare systems. As part of the research process, the study proceeds with the following research questions (RQ):

RQ1. What are the prevailing research trends and scientific productivity in TCM concerning asthma, allergies, and infertility diseases?

RQ2. What are the dominant areas of the research?

RQ3. Who are the most prolific researchers in the domain?

RQ4. Which journals have the most significant influence on TCM regarding asthma, allergies, and infertility diseases? How are co-citation networks formed between these journals?

RQ5. How are the country co-authorship and organizational co-authorship networks structured in the research?

RQ6. What are the highly globally cited articles in TCM concerning asthma, allergies, and infertility diseases?

RQ7. What are the altmetric attention scores of the top open-access articles in the specified area of TCM?

2. Materials and methods

2.1 *Database*

The study is based on research publications related to TCM, which concern asthma, allergies, and infertility, and are indexed by the Dimensions.ai database. Dimensions, a comprehensive scholarly database launched by Digital Science in January 2018, provides extensive coverage of peer-reviewed journal articles across biomedical, health sciences, and complementary and alternative medicine domains, along with citation counts that provide valuable impact assessment [23]. Additionally, Dimensions.ai provides Altmetric Attention Scores (AAS) to gauge online research attention, enhancing the strength of the bibliometric analysis.

The Dimensions.ai database was deliberately selected for this study because it integrates publication data with citation metrics and Altmetric Attention Scores (AAS) within a single platform, enabling simultaneous evaluation of scholarly impact and online research visibility. While databases such as PubMed primarily focus on biomedical literature and do not support large-scale citation or altmetric analyses, Scopus and Web of Science (WoS) require subscription access and offer limited integration of alternative impact indicators.

Furthermore, Dimensions.ai provides broader journal and regional coverage, particularly for emerging and interdisciplinary research areas such as TCM, which is crucial for capturing a comprehensive dataset. Therefore, the exclusive use of Dimensions.ai ensures methodological consistency, data completeness, and analytical hardiness, while avoiding duplication and compatibility issues that may arise from combining multiple databases.

1.2 *Search strategy*

The study involved certain parameters for the query are:

- Publications were searched within the title and abstract fields, focusing on the subject.
- The search date range was set from 2014 to 2023.
- Only publications categorized as "article" were considered.

The resulting query can be summarized as follows: search publications in the title and abstract only for "(Traditional Chinese medicine AND TCM AND asthma OR allergies OR infertility)" where the year is [2014:2023], and publication type is "article." The data was not restricted to publications affiliated exclusively with China. Instead, it encompasses global research outputs addressing TCM-related themes, regardless of the authors' institutional or national affiliations.

This query, executed on January 20, 2024, yielded a substantial dataset of 12,059 records, subsequently utilized for further analysis. The complete bibliographic metadata was obtained from the Dimensions database in Comma Separated Values (CSV) file format.

1.3 *Bibliometric tools*

Various scientometric analysis tools are available, each with unique capabilities and limitations. In this study, Biblioshiny, the shiny app for bibliometrix from the R Statistical Package[24], was used for network visualization in conjunction with VOSviewer [25]. The data downloaded from the Dimensions database in CSV format was analyzed using Biblioshiny to identify authors' profiles from prominent institutions, assess the impact of sources, and examine globally cited research publications. Additionally, VOSviewer software (Version 1.6.15) was employed to visualize the co-authorship network of countries and organizations, the co-citation network of journals, and the network citation analysis of researchers. Furthermore, Microsoft Excel was utilized for statistical and graphical analysis.

3. Results

3.1 *Yearly publications*

Table 1 presents data on closed and open publications, total publications, citations, and various citation metrics (2014-2023). The study uncovered that there were 12,059 publications (5,484 for closed access and 6,575 for open access) with 130,064 citations (51,562 for closed access and 78,502 for open access), resulting in an average FCR of 1.87 and an average RCR of 1.39 from 2014 to 2023. The total number of publications has generally increased yearly, with a significant jump in 2020 (n=1,417). The percentage of publications with at least one citation has varied, reaching a peak of 90.50% in 2016 and then experiencing a noticeable decline to 31.86% in 2023. Most publications are in the open access category (n=6,575), with 78,502 citations, compared to closed access with 51,562 citations (n=5,484). The average growth rate of publications is 12.78%. The maximum number of publications was observed in 2023 (n=974), with 12,566 citations, and for open publications in 2022 (n=1,404), with 20,568 citations. The number of citations for closed and open publications has consistently increased year by year, experiencing a notable spike in 2023. The FCR (Field Citation Ratio) and RCR (Relative Citation Ratio) offer insights into the impact of the publications [26].

The AFCR (Average Field Citation Ratio) is 1.87, indicating a positive overall influence of publications, and the ARCR (Average Relative Citation Ratio) is 1.39, suggesting a positive impact relative to the average. The FCR has generally increased from 2014 to 2020,

Table 1

Year-wise growth of publications

Year	Closed	Citation	Open	Citation	TP	Citations	Publications with citations (%, ≥1 citations)	FCR (geo mean)	RCR (mean)
2014	392	135	257	120	649	255	89.06	1.88	1.05
2015	395	723	286	526	681	1249	88.84	1.93	0.93
2016	326	1418	316	1161	642	2579	90.50	2.23	1.22
2017	410	2334	356	2224	766	4558	83.42	1.79	1.23
2018	433	3039	493	3407	926	6446	84.99	1.84	1.26
2019	526	4273	564	5161	1090	9434	88.07	2.05	1.40
2020	605	6070	812	9793	1417	15863	86.24	2.24	1.82
2021	712	8615	1024	14595	1736	23210	81.97	1.82	1.51
2022	711	12389	1404	20568	2115	32957	73.90	1.53	1.45
2023	974	12566	1063	20947	2037	33513	31.86	0.00	0.00
Total	5484	51562	6575	78502	12059	130064	74.69	1.87	1.39

"TP= Total Publications; FCR=Field Citation Ratio; RCR=Relative Citation Ratio"

indicating an improvement in the influence of publications. However, it sharply drops in 2023, indicating a significant change in citation patterns. The RCR shows an increasing trend, reaching its highest point in 2020, and like the FCR, it drops to zero in 2023, possibly due to a change in citation dynamics. Hence, the analysis reveals trends of increasing publications and citations over the years, with a notable drop in 2023.

3.2 *Research categories*

The publications related to TCM concerning asthma, allergies, and infertility, indexed in Dimensions.ai, have identified 12,059 documents distributed across 22 research categories. Figure 1 provides a graphical representation of the distribution of the top 20 research categories. The Dimensions database employs the Fields of Research (FOR) classification system, an integral part of the widely accepted Australian and New Zealand Standard Research Classification (ANZSRC), for categorizing research papers. Notably, the three most prominent categories in this research are Biomedical and Clinical Sciences

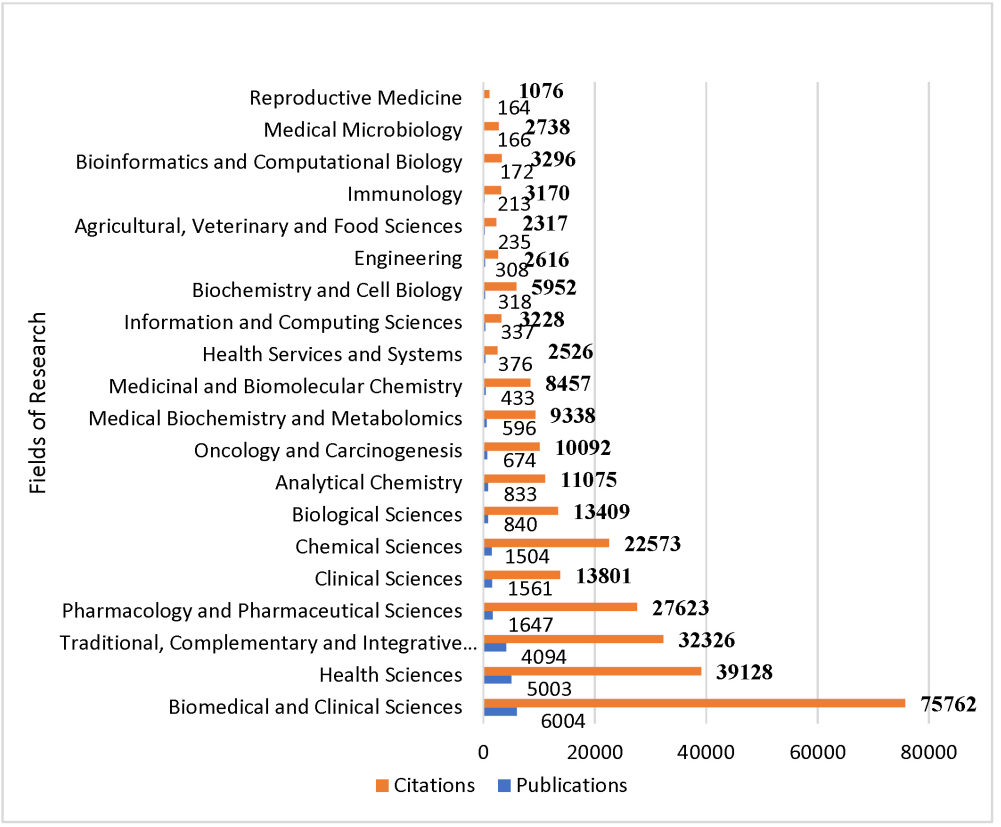


Figure 1

Top 20 research categories

(6,004 documents with 75,762 citations), Health Sciences (5,003 documents with 39,128 citations), and Traditional, Complementary and Integrative Medicine (4,094 documents with 32,326 citations). Among the top 20 categories, the least publications are from Medical Microbiology (166 documents with 2,738 citations) and Reproductive Medicine (164 documents with 1,076 citations), respectively.

3.3 *Leading researchers*

Table 2 presents a ranking of authors based on their total number of publications (TP), indicating the leading contributors in TCM research. Xue-Mei Qin ranks first in terms of 76

Table 2

Top most productive authors

Rank	Author Name	Organization	TP	Citations	CPP
1	Xue-Mei Qin	Shanxi University	76	1326	17.45
2	Jin-Ao Duan	Nanjing University of Chinese Medicine	61	1031	16.9
3	Hong-Cai Shang	Beijing University of Chinese Medicine	51	704	13.8
4	Xiao-Lin Tong	China Academy of Chinese Medical Sciences	46	1353	29.41
5	Calvin Yu-Chian Chen	Sun Yat-sen University	44	445	10.11
6	Lu-Qi Huang	China Academy of Chinese Medical Sciences	42	979	23.31
7	Hong-Jun Yang	China Academy of Chinese Medical Sciences	41	903	22.02
8	Yan-Ming Xie	China Academy of Chinese Medical Sciences	40	186	4.65
9	De-An Guo	Shanghai Institute of Materia Medica	37	1008	27.24
10	Ai-Ping Lu	Hong Kong Baptist University	35	622	17.77
11	Jun-Hua Zhang	Tianjin University of Traditional Chinese Medicine	35	547	15.63
12	Qingguo Wang	Beijing University of Chinese Medicine	35	610	17.43
13	Yu-Ping Tang	Shaanxi University of Chinese Medicine	34	765	22.5
14	Zhao-Xiang Bian	Hong Kong Baptist University	33	779	23.61
15	Wei Xiao	Kanion Pharmaceutical (China)	32	656	20.5
16	Shuang-Cheng Ma	National Institutes for Food and Drug Control	32	270	8.44
17	Xiao-Hui Fan	Zhejiang University	32	822	25.69
18	Guan-Hua Du	Chinese Academy of Medical Sciences & Peking Union Medical College	32	797	24.91
19	Hai-Xue Kuang	Heilongjiang University of Chinese Medicine	31	473	15.26
20	Xi-Jun Wang	Heilongjiang University of Chinese Medicine	31	1016	32.77

"TP= Total Publications; CPP= Citations Per Paper"

publications, indicating sustained research activity, and also shows strong citation performance, suggesting consistent scholarly influence. However, the data demonstrate that higher productivity does not always translate into higher impact. For instance, Xi-Jun Wang, with only 31 publications, records the highest citations per publication (CPP = 32.77), highlighting exceptional research quality and influence despite comparatively lower output. Similarly, Xiao-Lin Tong and De-An Guo show high CPP values (29.41 and 27.24 respectively), suggesting that their work attracts substantial attention within the field. In contrast, Yan-Ming Xie, although relatively productive (TP = 40), has a low CPP of 4.65, indicating limited citation impact and possibly narrower research visibility. Institutional concentration is another notable pattern: several high-performing authors are affiliated with the China Academy of Chinese Medical Sciences, reflecting its central role in driving impactful research. Universities specializing in traditional Chinese medicine, such as Beijing University of Chinese Medicine and Hong Kong Baptist University, contribute multiple influential authors, highlighting their academic strength in this domain. The presence of industry and regulatory institutions, such as Kanion Pharmaceutical and the National Institutes for Food and Drug Control, indicates engagement beyond academia, though their citation impact varies. These highlights a nuanced landscape where research influence is shaped not only by publication volume but also by citation intensity, institutional support, and the strategic focus of individual researchers.

3.4 *Highly productive journals*

Table 3 provides various journals based on parameters such as h-index, g-index, total citations (TC), and the number of published papers (NP). The H-index and G-index are essential metrics for evaluating the impact and productivity of journals. The H-index indicates the number of documents (h) with at least h citations, while the G-index considers the total number of citations and the rank of each paper [27-29]. Among the leading journals, *Journal of Ethnopharmacology* stands out as the most influential outlet, exhibiting the highest h-index (54), g-index (75), and total citations (13,771), despite publishing fewer papers than some China-based journals. This indicates a strong emphasis on highly cited, internationally visible research. Similarly, *Evidence-Based Complementary and Alternative Medicine* and *Frontiers in Pharmacology* show high citation counts and strong h- and g-indices, reflecting their role in widely cited studies. In contrast, journals such as the *China Journal of Chinese Materia Medica* and the *International Journal of Traditional Chinese Medicine* contribute a high number of publications but demonstrate comparatively lower citation impact, suggesting a more regionally focused readership or limited international reach.

A notable pattern is that journals published by major international publishers (Elsevier, Springer Nature, BioMed Central, and MDPI) generally achieve higher citation-based indicators even with moderate publication output, highlighting the influence of publisher visibility and indexing coverage. Multidisciplinary journals like *Scientific Reports* and *PLOS One* show moderate productivity but relatively strong citation performance, indicating cross-disciplinary appeal. These highlight a trade-off between productivity and impact,

where journals with fewer but higher-quality or more visible articles tend to achieve greater scholarly influence than high-output, niche-focused journals.

Table 3

Top 20 highly productive journals

Journals	Publisher	h_index	g_index	TC	TP
China Journal of Chinese Materia Medica	China Traditional Chinese Medicine Magazine	16	22	2085	808
Journal of Ethnopharmacology	Elsevier Ireland Ltd	54	75	13771	739
Evidence-Based Complementary and Alternative Medicine	Hindawi Publishing Corporation	36	49	7335	728
Frontiers in Pharmacology	Frontiers Media S.A.	35	62	7763	568
Medicine	Lippincott Williams and Wilkins Ltd.	17	23	1533	327
International Journal of Traditional Chinese Medicine	International Journal of Traditional Chinese Medicine	3	4	139	316
Traditional Chinese Medicine	Journal of Traditional Chinese Medicine	3	3	38	191
Molecules	Multidisciplinary Digital Publishing Institute (MDPI)	26	40	2630	177
Journal of Pharmaceutical and Biomedical Analysis	Elsevier	27	37	2772	173
Phytomedicine	Urban und Fischer Verlag Jena	30	47	3112	166
Chinese Medicine	BioMed Central Ltd.	26	41	2345	162
Journal of Traditional Chinese Medicine	Journal of Traditional Chinese Medicine	15	21	996	146
Biomedicine & Pharmacotherapy	Elsevier Masson S.R.L.	33	49	3202	135
BMC Complementary Medicine and Therapies	BioMed Central Ltd.	27	41	2430	130
Trials	BioMed Central Ltd.	12	16	685	116
Scientific Reports	Nature Publishing Group	32	56	3771	106
The American Journal of Chinese Medicine	World Scientific	27	49	2696	91
Biomed Research International	Hindawi Publishing Corporation	16	28	1054	91
European Journal of Integrative Medicine	Elsevier GmbH	13	19	595	89
PloS One	Public Library of Science	23	37	1638	77

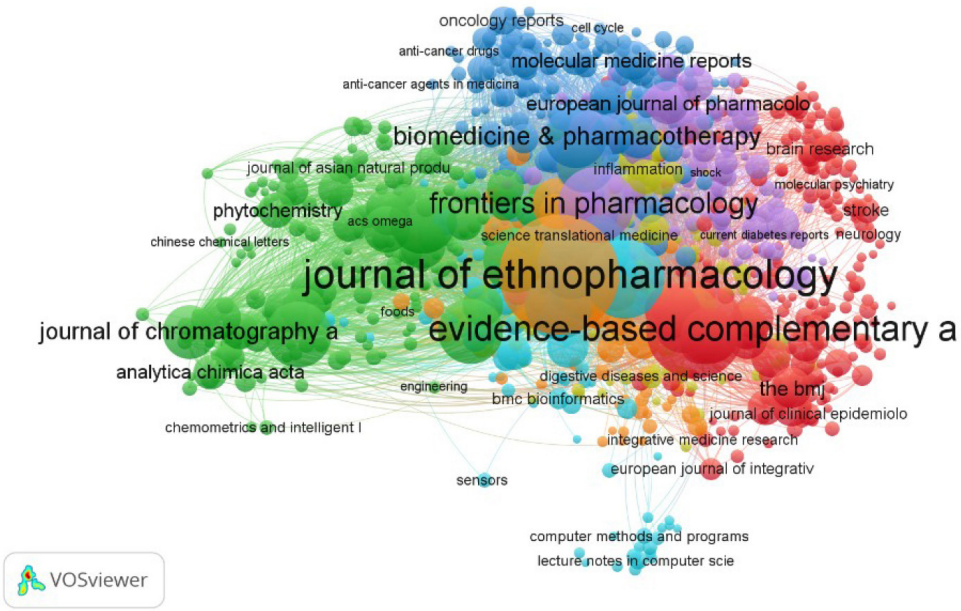


Figure 2

Co-citation network of journals

Furthermore, a co-citation analysis was conducted on 12,505 sources using VOSViewer to construct a network of journals with a minimum of 64 citations. Of these, 993 sources met the threshold, resulting in seven clusters, with a total link strength of 7,007,244. Figure 2 depicts the co-citation network, where each node represents a journal. Node size correlates with the total publications, and lines illustrate co-citation intensity [30]. The most prominent clusters are as follows: the red cluster comprises 226 nodes, the green cluster contains 186 nodes, the blue cluster comprises 166 nodes, the yellow cluster comprises 134 nodes, the violet cluster comprises 124 nodes, the shallow blue cluster includes 94 nodes, and the orange cluster comprises 63 nodes. Within this co-citation network, the Journal of Ethnopharmacology stands out in the orange cluster, with one of the highest co-citations (cit-11368). Evidence-Based Complementary and Alternative Medicine follows it in the red cluster, which has the second-highest co-citation (cit-7638) within its field.

3.5 *Country co-authorship analysis*

Country co-authorship analysis is a significant form of collaboration among nations [31]. Countries that contributed at least two publications were selected; out of 110 countries, only 65 met the threshold value. The selected countries were then categorized into 11 clusters, forming 320 links with a total link strength of 1609, as illustrated in the Figure. 3. The clusters, represented by various colors, signify the diversification of TCM research across different countries, indicating collaborative efforts among multiple authors. In the

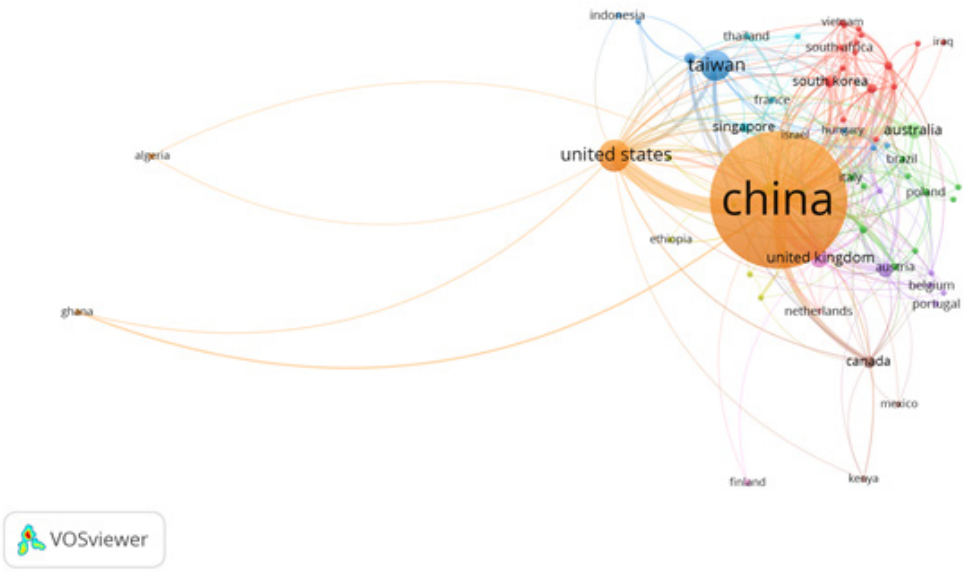


Figure 3

Co-authorship analysis of countries

visual representation, the larger nodes represent influential countries, while the links between nodes illustrate cooperative research relationships among diverse nations. The distance between nodes and the thickness of the links reflect the extent of collaboration among countries. Notably, China and the United States of America (USA) belong to Cluster 7 (Orange), highlighting their dominance in the number of documents and citations. China leads with 9,361 documents and 114,114 citations, while the USA follows with 524 documents and 8,900 citations. Taiwan, placed in Cluster 3 (Blue), demonstrates significant performance, contributing 463 documents and 6400 citations, establishing itself as a strong contributor. The United Kingdom, Australia, and Germany, assigned to Clusters 9 (Purple), 11 (Green), and 5 (Violet), respectively, exhibit competitive citation numbers, emphasizing their research impact. Canada, India, Japan, and South Korea, representing Clusters 8 (Brown), 4 (Yellow), 3 (Blue), and 1 (Red), respectively, also contribute significantly to the global research landscape, each with a varying number of documents and citation strengths within the top 10 countries.

3.6 *Co-authorship analysis of organizations*

Organizational co-authorship analysis provides insight into scholarly communication across institutions in a research field. It is established that the minimum number of documents required for an organization is set at six. Out of the 9,040 organizations found, 567 met these thresholds, of which 561 items are interconnected, forming 15 clusters, with

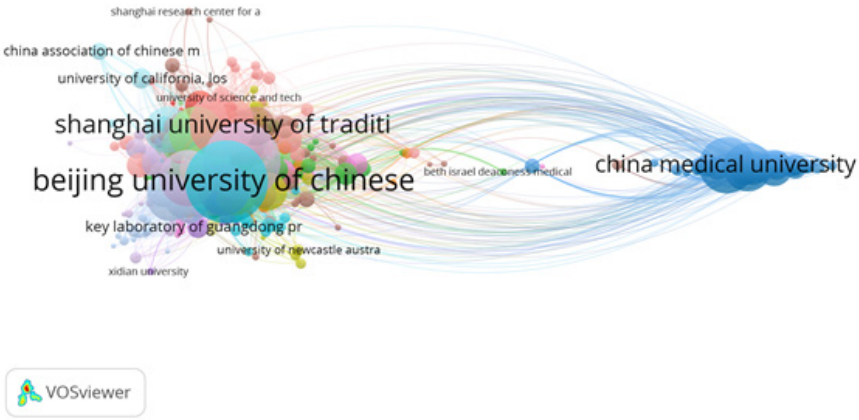


Figure 4

Co-authorship analysis of organizations

a total of 7,422 links and a combined link strength of 17,214. In Figure 4, each circle represents an organization, with its size indicating the number of articles produced. The top five institutions with citations and large total link strength were as follows: Beijing University of Chinese Medicine with 1044 publications and 6 (blue) cluster (Cit=11883; TLS=5292), China Academy of Chinese Medical Sciences with 721 publications and 14 (light violet) cluster (Cit=7637; TLS=1302), Shanghai University of Traditional Chinese Medicine with 645 publications and 10 (light red) cluster (Cit=7280; TLS=917), China Medical University with 248 publications and 3 (blue) cluster (Cit=3429; TLS=694), and Chinese Academy of Medical Sciences & Peking Union Medical College with 405 publications and 14 (light violet) cluster (Cit=7068; TLS=683), respectively. Total link strength values reflect the overall collaboration strength of an institution with others through co-authorship.

Table 4

Top 10 globally cited papers

Authors	Journals	Title	Year	TC	TCPY	NTC
Ru, J. et al.	Journal of Cheminformatics	TCMSP: a database of systems pharmacology for drug discovery from herbal medicines	2014	2847	258.82	124.80
Wan, S. et al.	Journal of Medical Virology	Clinical features and treatment of COVID-19 patients in northeast Chongqing	2020	794	158.80	50.93

Contd...

Yang, Y. et al.	International Journal of Biological Sciences	Traditional Chinese Medicine in the Treatment of Patients Infected with 2019-New Coronavirus (SARS-CoV-2): A Review and Perspective	2020	719	143.80	46.12
Zhang, R. et al.	Frontiers in Pharmacology	Network Pharmacology Databases for Traditional Chinese Medicine: Review and Assessment	2019	702	117.00	44.89
Liu, Z. et al.	Scientific Reports	BATMAN-TCM: a Bioinformatics Analysis Tool for Molecular mechANism of Traditional Chinese Medicine	2016	581	64.56	26.23
Runfeng, L. et al.	Pharmacological Research	Lianhuaqingwen exerts anti-viral and anti-inflammatory activity against novel coronavirus (SARS-CoV-2)	2020	521	104.20	33.42
Xu, H. et al.	Nucleic Acids Research	ETCM: an encyclopaedia of traditional Chinese Medicine	2018	468	66.86	30.11
Xiang, Y. et al.	Cancer Medicine	Traditional Chinese Medicine as a cancer treatment: Modern perspectives of ancient but advanced science	2019	425	70.83	27.17
Hao, P. et al.	Journal of the American College of Cardiology	Traditional Chinese Medicine for Cardiovascular Disease Evidence and Potential Mechanisms	2017	357	44.63	19.30
An, J. et al.	Life Sciences	Natural products for treatment of osteoporosis: The effects and mechanisms on promoting osteoblast-mediated bone formation	2016	353	39.22	15.94

"TC- Total Citations; TCPY- Total Citations per Year; NTC- Normalized Total Citations"

3.7 *Globally cited papers*

Table 4 represent various medical research topics, mainly focusing on TCM and its application in different health conditions. It is revealed that the highly cited papers are found within the top 10 articles: Ru et al.'s TCMSP (2014) standing out by a substantial margin, recording the highest total citations (TC = 2847) and normalized citation impact (NTC = 124.80), indicating its foundational role in systems pharmacology and network-based TCM research. Similar resources such as BATMAN-TCM and ETCM also show sustained influence, reflecting the community's reliance on curated, computational infrastructures. In contrast, COVID-19–related studies published in 2020 (e.g., Wan et al., Yang et al., and Runfeng et al.) exhibit exceptionally high citations per year (TCPY > 100), highlighting a sharp, time-bound surge driven by global urgency rather than long-term accumulation. Review articles and perspective papers, particularly those linking TCM with modern biomedical frameworks (e.g., network pharmacology, cancer, cardiovascular disease), show moderate but consistent citation performance, suggesting steady interdisciplinary relevance. Across journals, higher-impact and broadly scoped outlets (e.g., Journal of Cheminformatics, JACC, Pharmacological Research) tend to host papers with stronger citation visibility, implying that methodological innovation and clinical relevance jointly enhance impact.

3.8 *Altmetric Attention Score*

Table 5 reveal clear patterns in how research on traditional and complementary medicine attracts public and online attention relative to scholarly impact. Studies linked to COVID-19 dominate the highest AAS rankings, indicating that topical relevance and societal urgency strongly drive online engagement. The top-ranked article on Traditional Chinese Medicine (TCM) for mental disorders in COVID-19 survivors shows an exceptionally high AAS (940) despite relatively modest citations, suggesting intense media, policy, and social media interest beyond the academic community. Similarly, case reports and reviews on COVID-19 treatments using Ayurveda or TCM demonstrate disproportionately high AAS compared to their citation counts, highlighting how clinically relevant and pandemic-related content resonates widely with non-academic audiences. In contrast, older foundational or mechanistic studies, such as those published in 2014–2015, exhibit lower AAS but comparatively higher citation counts, reflecting sustained scholarly use rather than immediate public attention. This divergence indicates that AAS captures short-term societal visibility, while citations reflect long-term academic influence. Another notable pattern is the high AAS of clinical and safety-oriented studies, such as trials on Korean Red Ginseng or acupuncture, implying strong public interest in evidence-based validation of traditional therapies. The presence of a retracted article with a relatively high AAS further highlights that online attention does not necessarily correlate with research quality or reliability, but rather with topic sensitivity and visibility.

Table 5

Highly papers based on altmetric attention score (AAS)

Rank	Title	Journal	AAS	Citations	PY
1	From the perspective of Traditional Chinese Medicine: Treatment of mental disorders in COVID-19 survivors	Biomedicine & Pharmacotherapy	940	28	2020
2	Safety and antifatigue effect of Korean Red Ginseng: a randomized, double-blind, and placebo-controlled clinical trial	Journal of Ginseng Research	557	13	2019
3	Ayurvedic treatment of COVID-19: A case report	Journal of Ayurveda & Integrative Medicine	447	69	2022
4	Prevention and treatment of COVID-19 using Traditional Chinese Medicine: A review	Phytomedicine	400	171	2021
5	Active components in Ephedra sinicastapf disrupt the interaction between ACE2 and SARS-CoV-2 RBD: Potent COVID-19 therapeutic agents	Journal of Ethnopharmacology	399	27	2021
6	A preliminary review of studies on adaptogens: comparison of their bioactivity in TCM with that of ginseng-like herbs used worldwide	Chinese Medicine	324	51	2018
7	Does Acupuncture Reduce Stress Over Time? A Clinical Heart Rate Variability Study in Hypertensive Patients	Medical Acupuncture	301	11	2014
8	Retracted: Maternal traditional Chinese medicine exposure and risk of congenital malformations: a multicenter prospective cohort study	Acta Obstetricia et Gynecologica Scandinavica	284	2	2023
9	Combined DNA, toxicological and heavy metal analyses provides an auditing toolkit to improve pharmacovigilance of traditional Chinese Medicine (TCM)	Scientific Reports	250	87	2015
10	A Novel Analgesic Isolated from a Traditional Chinese Medicine	Current Biology	237	80	2014

"AAS-Altmetric Attention Score; PY-Publication Year"

4. Discussion

The present scientometric analysis demonstrates a sustained and rapidly expanding body of literature on TCM related to asthma, allergies, and infertility between 2014 and 2023, with a clear dominance of China in publication output, institutional leadership, and citation impact. The steady growth rate of publications and the predominance of OA articles indicate both increasing research investment and an effort to enhance global visibility. Similar growth increases have been seen in earlier bibliometric studies on TCM, which consistently highlight China's central role and the concentration of influential research within specialized TCM universities and national research institutes [21,22]. The sharp rise in publications around 2020 aligns with previous observations that global health emergencies, particularly COVID-19, catalysed broader interest in traditional medical systems, indirectly strong methodological and pharmacological research infrastructure that also benefits chronic disease domains.

The distribution of research categories highlights the interdisciplinary nature of contemporary TCM research, with strong linkages to biomedical and clinical sciences. This pattern is consistent with earlier analyses showing a gradual shift from descriptive ethnopharmacology toward mechanism-oriented and systems-based approaches, such as network pharmacology and molecular validation [22].

Highly cited foundational resources, including TCMSP [32] and BATMAN-TCM [33], further support this transition and explain the relatively high citation impact observed despite variability in journal productivity. In comparison with previous studies, the current findings reaffirm that publication volume alone does not guarantee influence; rather, methodological innovation and integration with modern biomedical frameworks remain key drivers of citation performance.

In relation to Indian Traditional Medicine (ITM), particularly Ayurveda [34], both systems share philosophical roots in holism, balance, and individualized treatment, emphasizing the regulation of bodily systems rather than symptom suppression. However, they differ substantially in theoretical constructs and research growth[35]. TCM is grounded in concepts such as Qi, Yin–Yang [36], and meridians [37], whereas Ayurveda is structured around Dosha theory (Vata, Pitta, Kapha) and Prakriti-based personalization [38]. From a research perspective, TCM has benefited from stronger state-led institutionalization, standardized education, and integration into national healthcare systems, which has translated into higher global research output and citation visibility. Bibliometric evidence shows that TCM-related publications far exceed those of Ayurveda in international databases, a pattern also reported in comparative studies of Asian traditional medicines, where Ayurveda research is often more fragmented and regionally concentrated.

5. Finding and Conclusion

This study provides a comprehensive scientometric analysis of the research landscape on TCM's role in addressing asthma, allergies, and infertility. Analysing 12,059 publications

from 2014 to 2023 reveals significant growth in the volume and impact of TCM research, with a notable increase in citations and research output, particularly in 2020. Key contributors to the field include highly productive institutions, such as the Beijing University of Chinese Medicine, and influential journals, including the *China Journal of Chinese Materia Medica* and the *Journal of Ethnopharmacology*. Additionally, the study highlights the prominence of Chinese scholars and institutions in the global TCM research landscape, with notable contributions also coming from countries such as the USA, Taiwan, and the UK.

The implications of these findings are twofold. First, the increasing global interest in TCM indicates its potential as a complementary or alternative therapeutic approach for asthma, allergies, and infertility, conditions that remain significant public health challenges. The study provides valuable insights for researchers, clinicians, and policymakers, fostering a more nuanced understanding of the trends, gaps, and emerging areas in this domain. Second, the findings highlight the need for further research to establish the molecular mechanisms underlying TCM treatments and to standardize clinical protocols, which are essential for integrating TCM into mainstream healthcare.

Future research should prioritize addressing the identified barriers, such as enhancing international collaboration and fostering a consensus on standardized protocols for clinical trials. There is also a pressing need for interdisciplinary studies that incorporate modern diagnostic tools and molecular research into TCM practices, which will likely bolster its credibility and efficacy in treating chronic conditions. Additionally, exploring the safety profiles and potential interactions of TCM therapies with conventional treatments could enhance patient outcomes and increase the acceptance of TCM in global healthcare settings. This study lays the groundwork for ongoing research and highlights the need for a sustained, collaborative effort to harness the full potential of TCM in addressing asthma, allergies, and infertility.

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Conflicts of interest

There are no conflicts of interest.

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