

# A Bibliometric Analysis of Chinese Medicine for Allergic Rhinitis

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**Purpose:** This study aims to assess the current research status of Chinese medicine research on treating allergic rhinitis (AR) using bibliometric methods, and to explore research hotspots and pinpoint future trends in this field.

**Methods:** Articles concerning Chinese medicine for AR in Web of Science Core Collection databases were searched from January 1, 2004, to May 31, 2024. VOSviewer 1.6.20 and CiteSpace 6.3.R1 software were used to conduct descriptive analysis, including publications, authors, countries, institutions, journals, cited journals, cited authors, cited references, and keywords from various angles.

**Results:** A total of 221 publications were included. Paper production has increased over the past 20 years, despite fluctuations. The most productive country is China, whose Chengdu University of Traditional Chinese Medicine is the institution with the highest number of papers. Germany's Brinkhaus, Benno has the most papers in the discipline, while Bousquet J is the most influential author. *Medicine* is a journal that has the most research on Chinese medicine for treating AR, while *Allergy* has the most citations. The most frequently cited reference is a guideline concerning the diagnosis and treatment of AR. The most common keywords are allergic rhinitis, asthma, effect, prevalence, and Chinese herbal medicine.

**Conclusion:** This study assessed the research status of Chinese medicine for AR via bibliometric approaches from 2004 to 2024, which may be useful for researchers to identify hotspots and frontier trends in this field.

**Keywords:** bibliometrics, allergic rhinitis, Chinese medicine, CiteSpace, VOSviewer

## Introduction

Allergic rhinitis (AR) is a chronic inflammatory disease of the nasal mucosa traditionally considered to be mediated by IgE after exposure to allergens. However, recent evidence suggests that non-IgE-mediated mechanisms also contribute to AR pathogenesis, such as novel inflammatory pathways mediated by T cells and histamine.<sup>1</sup> The primary symptoms of AR include rhinorrhea, nasal congestion, nasal itching, sneezing, or itching in the eyes, ears, palate, and throat.<sup>2,3</sup> At present, 400 million people worldwide are affected by AR.<sup>4</sup> The approximate occurrence rate of AR ranges from 5% to 15% among children, and from 10% to 40% among adults.<sup>5</sup> AR has become increasingly common and is a global health problem that seriously affects patients' sleep, life, and work.<sup>6</sup> Currently, the main treatments for AR include drug therapy, such as hormones, antihistamines, intranasal steroids, leukotriene receptor antagonists, immunotherapy, and even surgery.<sup>3,7-9</sup> Although the above methods have shown positive results in the treatment and prevention of AR, these drugs require long treatment cycles and easily recur after the cessation of treatment. Not only do hormones have a certain degree of dependency, but according to a report on the treatment of AR with fluticasone furoate nasal spray, daily use of the spray was found to slightly decrease the growth rate of children.<sup>10</sup> Furthermore, montelukast, a leukotriene receptor antagonist, can be used to treat AR and asthma, but it may cause neuropsychiatric disorders and allergic granulomatous angiitis.<sup>11</sup> Second-generation antihistamines can cause toxicity in humans, with skin eruptions, headache, and somnolence being the most common adverse reactions.<sup>12</sup>

As a result, many patients have begun to explore complementary and alternative therapies, and CM is a popular choice. Because of its naturalness and gentleness, CM is often regarded as a safe and effective form of treatment and is

trusted by the general public. Over the past 20 years, there have been an increasing number of studies on the treatment of AR with CM. These studies have shown that CM is safe and effective in treating allergic diseases. Yang et al demonstrated in a randomized controlled study that Bu-zhong-yi-qi-tang could be effective in treating AR by reducing the local inflammatory response and alleviating nasal symptoms.<sup>13</sup> Daniela Adam et al demonstrated that acupuncture can regulate the immune system and suppress the increase in serum IgE levels, thereby improving quality of life and alleviating symptoms of seasonal AR.<sup>14</sup>

As an interdisciplinary science, bibliometrics is used for analyzing published information and metadata (eg abstracts, keywords) to demonstrate relationships between works via statistical data.<sup>15</sup> It uses statistical indicators to weigh inputs to the field of research, including those from different countries, institutions, journals, or authors, and to predict trends or hotspots in the field.<sup>16</sup> Recently, this research approach has been used to identify CM research trends, including lung cancer,<sup>17</sup> heart failure,<sup>18</sup> and nephrotic syndrome.<sup>19</sup>

VOSviewer and CiteSpace are the most extensively employed software tools in the field of bibliometrics. They are visualization and analysis software developed by Prof. Van Eck of Leiden University, the Netherlands, and Prof. Chao-Mei Chen of Drexel University, USA, respectively.<sup>20,21</sup>

To date, no extensive article utilizing bibliometric methods has been published on CM for AR. Thus, this research was based on the Web of Science Core Collection (WoSCC) of publications on CM for AR from 2004 to 2024 and used two widely used bibliometric tools, namely CiteSpace and VOSviewer, to explore the research hotspots and frontiers.

## Materials and Methods

### Data Source and Search Strategy

All studies were extracted from the Web of Science Core Collection (WoSCC) database from January 1, 2004, to May 31, 2024. The search strategy was as follows: (TI=(Allergic Rhinitis OR Rhinitis, Allergic OR Allergic Rhinitides OR Rhinitides, Allergic)) AND TS=(Acupoint OR Acupuncture OR Needle OR Moxibustion OR Massage OR Cupping OR Bloodletting OR Auricular point OR Acupuncture analgesia OR Traditional Chinese Medicine OR Chinese Medicine OR Chinese Herb OR Chinese Herbal Drug). In total, 221 articles were retrieved, and the search procedure is meticulously presented in [Figure 1](#). The studies that were eligible for consideration were exclusively those published in English and were limited to only articles and review articles. All retrieved studies that met inclusion criteria and did not meet the exclusion criteria were independently screened by two researchers (Zheng-Fan Wang and Yong-Qi Du). Any controversial articles were resolved through consensus reached by a third researcher (Jun Xiong). We manually excluded editorial material, meeting abstract, retracted publication, early access, letter, and articles not related to this research topic.

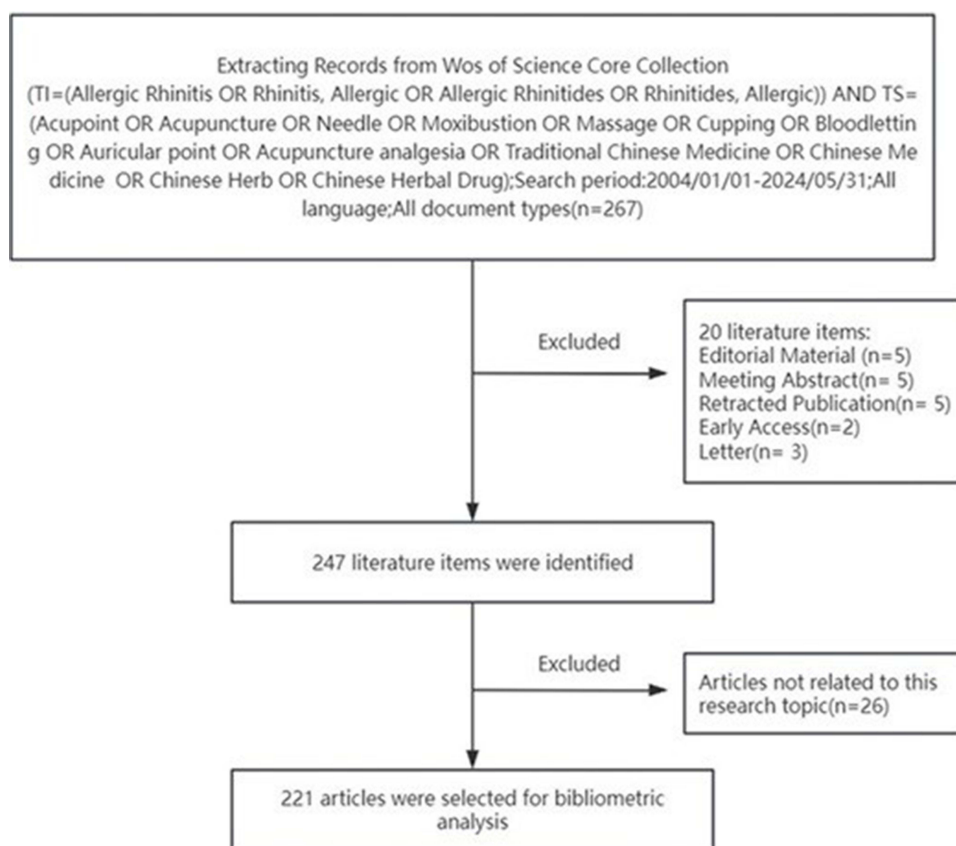
### Bibliometric Analysis

We used Excel to manage the data and graph the annual trend of publications. Productivity is measured by the gross number of publications, and impact is represented by the gross number of citations.<sup>22</sup> All the selected studies were downloaded from the “Plain Text File” and imported into CiteSpace 6.3.R1 and VOSviewer 1.6.20 for further bibliometric analysis, including: (1) descriptive statistical analysis of publications for the annual number of publications, authors, institutions, countries, and journals; (2) co-cited network analysis for co-cited authors, journal and references; (3) co-occurrence, cluster, and time-line analysis of keywords; and (4) citation burst analysis for keywords and references.

For the CiteSpace analysis, the parameters were set as follows. The time span was from January 2004 to May 2024, with the time slice set to once per year. The “term source” is selected as all selections, and the scale factor  $k$  is set at 25. Additionally, the LLR algorithm is applied during the clustering of the graph, and the pathfinder and pruning sliced networks are used. In VOSviewer, the upper limit for the quantity of documents of a single source is configured as 25.

### Chart Interpretation

Each node represents an element, with its diameter size indicating the frequency of occurrence. The varying colors of the nodes signify distinct years, while the links between nodes symbolize the relationships between two distinct elements. The greater the thickness of a link, the stronger the bond it represents.



**Figure 1** Flow chart of the literature screening process.

## Result

### Annual Trends in the Volume of Publications

Over the preceding two decades, a cumulative total of 221 publications concerning CM for AR have been released, which included 163 articles (73.76%) and 58 review articles (26.24%). The yearly count of publications is shown in [Figure 2](#). During the decade spanning from 2004 to 2014, production was sluggish, averaging fewer than 8 articles annually. However, from 2014 to 2024, despite experiencing some variations, the overall output witnessed a marked increase. Notably, the highest number of publications was in 2022 (28 publications), and the lowest number of publications was in 2005 (0 publications).

### Analysis of Countries/Regions

An analysis diagram of countries/regions was generated by CiteSpace, which is shown in [Figure 3](#), and 21 nodes and 26 links were presented in the network. In total, a total of 21 countries/regions have contributed to the publications on CM in the treatment of AR. The top 10 countries/regions in terms of publications and centrality are shown in [Table 1](#). The highest number of articles were published by China (153 publications, 69.23%), followed by Taiwan (17 publications, 7.69%) and South Korea (17 publications, 7.69%). China (0.39) has the highest centrality, followed by Germany (0.26), which shows that China and Germany play a significant role in intercountry cooperation.

### Analysis of Institutions

The network analysis diagram of institutions is depicted in [Figure 4](#) with 198 nodes, 423 edges, and a density of 0.0217, indicating that there were 198 institutions producing research regarding CM in the treatment of AR. [Table 2](#) displays the top 10 institutions in terms of centrality and number of publications. Publications from Chengdu University of Chinese Medicine (23 publications) are at the top of the list. Yet Beijing University of Chinese Medicine (22 publications)

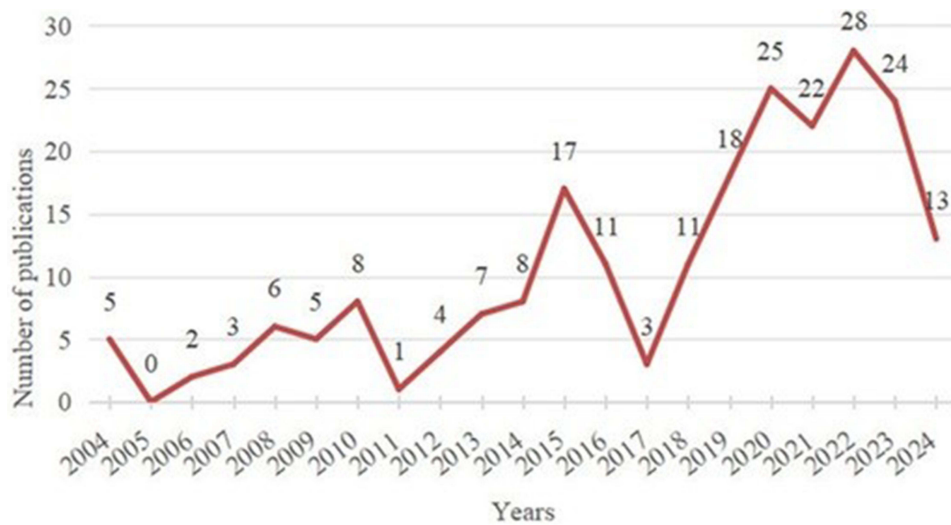


Figure 2 The trend map of annual publications from 2004 to 2024.



Figure 3 Map of countries/regions related to CM for AR.

published just one fewer article than Chengdu University of Chinese Medicine. And Beijing University of Chinese Medicine has the highest centrality (0.4), followed by Kyung Hee University (0.34), demonstrating that Beijing University of Chinese Medicine plays a crucial role in the treatment of AR in CM.

### Analysis of Authors and Co-Cited Authors

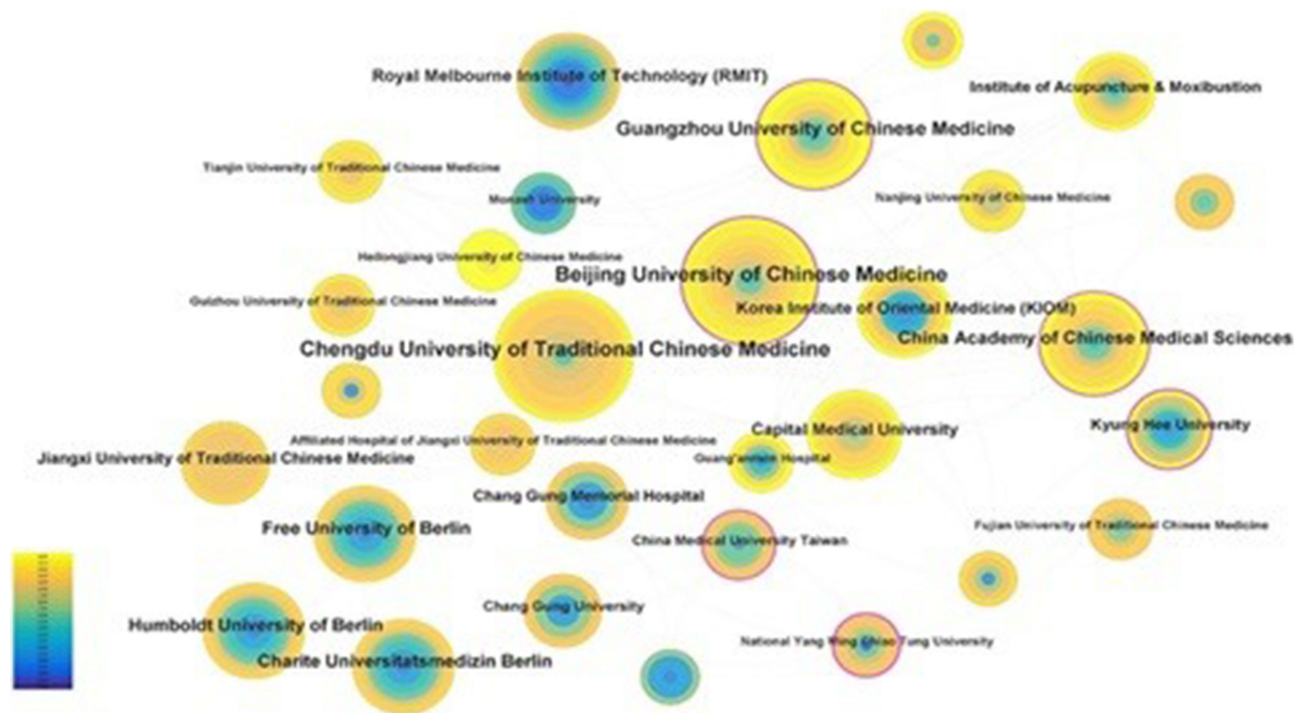
Figure 5 depicts the network analysis map of authors with 417 nodes, 802 edges, and a density of 0.0092. An author is represented by a node in the network graph of authors, and the size of a node indicates how many articles the author has published. Hence, a total of 417 authors published studies on CM in the treatment of AR from 2004 to 2024. The above data demonstrates that the vast majority of collaborations among researchers are predominantly intra-team focused, with

**Table 1** Top 10 Countries/Regions Related to CM in AR Research Publications From 2004 to 2024

RANK	Counts	Country/Region	RANK	Centrality	Country/Region
1	153	China	1	0.39	China
2	17	Taiwan	2	0.26	Germany
4	16	Germany	4	0.13	Japan
5	14	Australia	5	0.1	Taiwan
6	8	USA	6	0.02	Australia
7	6	England	7	0.02	USA
8	5	Japan	8	0	South Korea
9	3	Spain	9	0	Spain
10	2	Sweden	10	0	Sweden

limited instances of inter-team collaboration. Table 3 lists the top 10 authors who contributed articles in the domain. Brinkhaus, Benno is regarded as the most vibrant author in the field with a frequency of 13 articles, followed by Chen, Sheng, and Zhang Qinxu. In accordance with Price's square root law,<sup>23</sup> authors with three or more publications in the research area are regarded as core authors. After careful computation, the number of core authors in this field accounted for only 7.2% (30 authors) of the total number of articles (417 authors), suggesting that researchers in CM treatment of AR are relatively dispersed and have not developed a core group of authors.

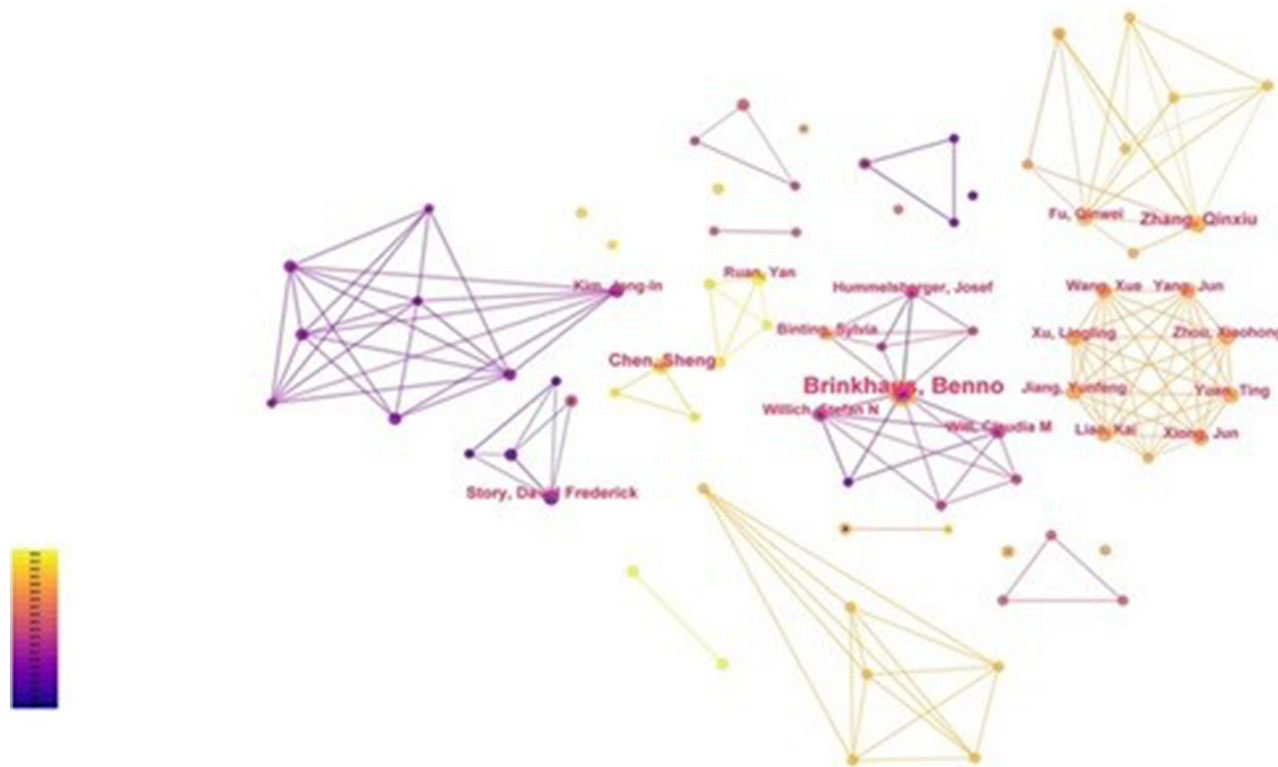
Cited authors is the phenomenon where two or more authors are co-cited by other literature.<sup>24</sup> Among all the co-cited authors, six have achieved more than 50 joint citations. The top 10 cited authors are shown in Table 4. Bousquet, J (146 citations) is the top ranked author in terms of citations, paying attention to asthma and AR research, followed by Xue, CCL

**Figure 4** Map of institutions related to CM for AR.

**Table 2** Top 10 Institutions Related to CM in AR Research Publications From 2004 to 2024

RANK	Counts	Institutions	RANK	Centrality	Institutions
1	23	Chengdu University of Traditional Chinese Medicine	1	0.4	Beijing University of Chinese Medicine
2	22	Beijing University of Chinese Medicine	2	0.34	Kyung Hee University
3	16	Guangzhou University of Chinese Medicine	3	0.31	National Yang Ming Chiao Tung University
4	14	China Academy of Chinese Medical Sciences	4	0.18	Harvard University
5	13	Charite Universitatsmedizin Berlin	5	0.16	Guangzhou University of Chinese Medicine
6	13	Free University of Berlin	6	0.15	China Medical University Taiwan
7	13	Humboldt University of Berlin	7	0.09	Chengdu University of Traditional Chinese Medicine
8	12	Royal Melbourne Institute of Technology (RMIT)	8	0.09	Royal Melbourne Institute of Technology (RMIT)
9	10	Korea Institute of Oriental Medicine (KIOM)	9	0.09	Asia University Taiwan
10	10	Capital Medical University	10	0.08	Guizhou University of Traditional Chinese Medicine

(103 citations), and Brinkhaus, B (95 citations). Furthermore, we screened all authors with more than 15 co-citations and mapped the co-citation network visualization and density visualization diagram via VOSviewer (Figures 6 and 7). In network Visualization map, nodes represent cited authors, with size proportional to citation frequency. Density visualization map replaces the node with color, where high-density zones highlight author concentration areas with high citation counts, and low-density zones show sparsely cited authors. We observed close collaboration between different co-cited authors, such as Bousquet, J, Seidman, MD and Xue CCL.



**Figure 5** Map of authors related to CM for AR.

**Table 3** Top 10 Authors Related to CM in AR Research Publications From 2004 to 2024

Rank	Author	Counts	RANK	Author	Count
1	Brinkhaus, Benno	13	6	Fu, Qinwei	4
2	Chen, Sheng	6	7	Hummelsberger, Josef	4
3	Zhang, Qinxiu	6	8	Willich, Stefan N	4
4	Story, David Frederick	5	9	Kim, Jong-In	4
5	Binting, Sylvia	4	10	Witt, Claudia M	4

**Table 4** Top 10 Co-Cited Authors Related to CM in AR Research Publications From 2004 to 2024

RANK	Author	Counts	RANK	Author	Counts
1	Bousquet, J	146	6	Seidman, MD	60
2	Xue, CCL	103	7	Yang, SH	49
3	Brinkhaus, B	95	8	Meltzer, EO	46
4	Juniper, EF	75	9	Zhang, Y	38
5	Brozek, JL	71	10	Schafer, T	34

## Analysis of Co-Cited References

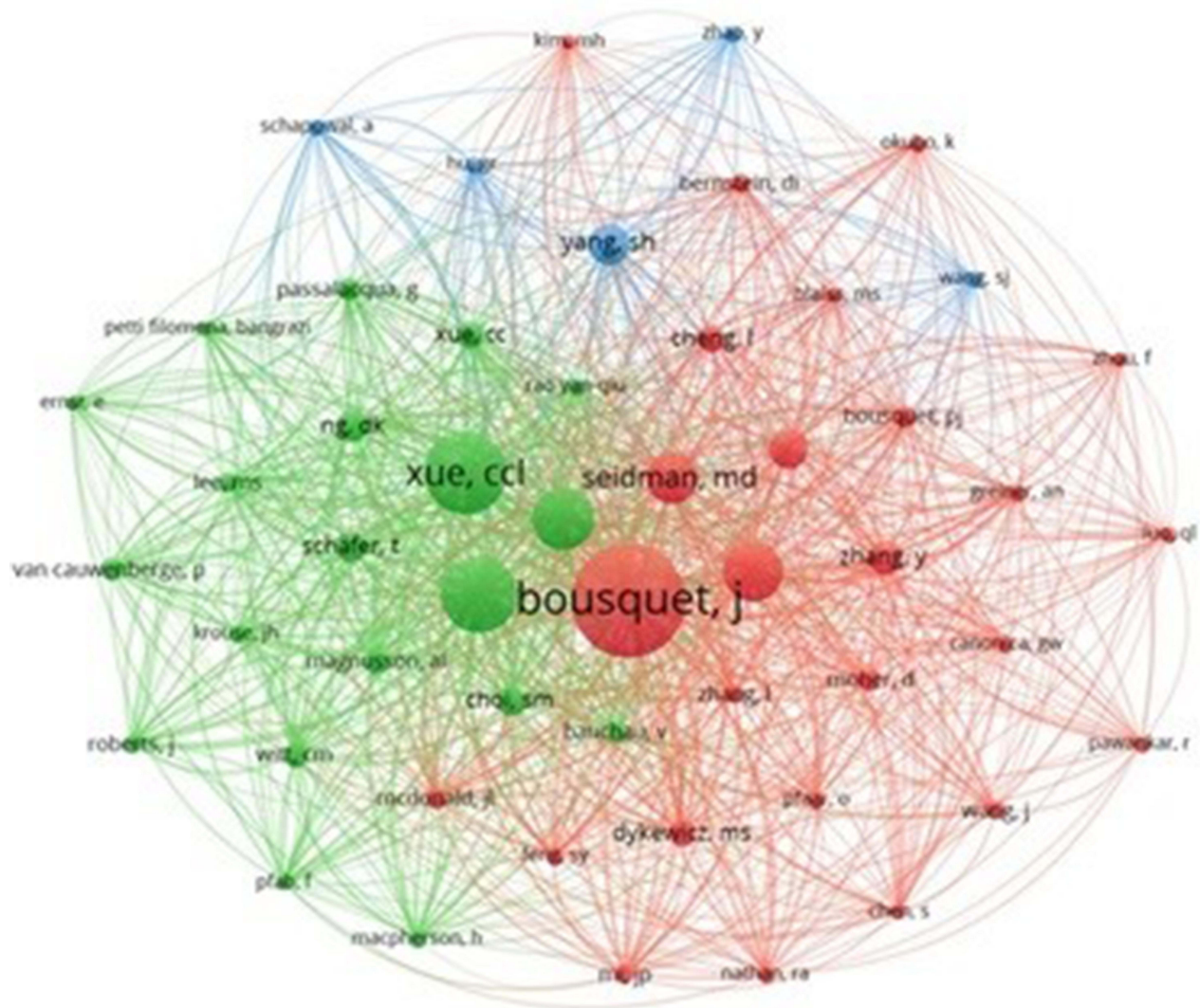
A co-cited reference occurs when one reference cites two other references.<sup>14</sup> The network analysis map of the co-cited references, which included a total of 567 references, was plotted via CiteSpace software, as shown in Figure 8. The top 5 co-cited references in terms of citation frequency are shown in Table 5. The article published in *Allergy Asthma & Immunology Research* by Cheng L in 2018 had the highest number of co-citation,<sup>25</sup> followed by the articles published in the *Journal of Allergy And Clinical Immunology* by Brozek JL in 2017,<sup>26</sup> and the article published in *Nature Reviews Disease Primers* by Bousquet J in 2020.<sup>27</sup> In the meantime, among these five references, three are focused on AR guidelines, indicating that research designs generally follow guidelines, and uses them as the foundation for implementation.

The top 15 most cited references with the strongest citation bursts are shown in Figure 9.<sup>2,25–27,29–39</sup> The article titled “Allergic rhinitis” written by Bousquet J has the highest citation centrality from 2022 to 2024, introducing epidemiology, mechanisms, diagnosis, and treatment of AR and so on.<sup>27</sup> In addition, Seidman, MD published a clinical practice guideline paper on AR in *Otolaryngology-Head and Neck Surgery* that focused on providing effective recommendations for the treatment of AR.<sup>2</sup>

## Analysis of Journals and Co-Cited Journals

From 2004 to 2024, a cumulative total of 221 articles pertaining to the utilization of CM in the management of AR have been published in 96 different journals. As shown in Table 6, the most prolific journal is *Medicine*, with 24 articles, followed by *Evidence-based Complementary and Alternative Medicine*, with 16 articles, and *Trials*, with 15 articles. We subsequently employed VOSviewer to generate an overlay visualization map of journals related to CM for AR shown in Figure 10, where the size of the nodes represents the number of journal publications, and the color signifies the publication year, with hues closer to yellow indicating later publication years. As shown in Figure 10, recently, there has been a notable increase in the number of articles in this field published in *Medicine*.

A cited journal is a journal that has been cited or referenced by other literature in the academic literature. It is one of the most important indicators of academic impact and the value of a journal. A network diagram of co-cited journals is presented in Figure 11. A journal is represented as a node, and the size of the node indicates how many citations it has received. The larger the node, the greater the influence of the journal becomes, as evidenced by a higher number of citations,



**Figure 6** Network visualization map of co-cited authors related to CM for AR.

thereby occupying a more prominent position among researchers exploring the treatment of AR via CM. The top 10 co-cited journals are shown in [Table 7](#). Allergy has the most citations for AR research (182 citations), followed by the Journal of Allergy and Clinical Immunology (177 citations) and the Annals of Allergy Asthma & Immunology (118 citations). The latter two journals focus on research related to immunology.

## Analysis of Keywords

Keywords, as refined identifiers, can highly summarize the research methods, research objects, and core issues in academic papers.<sup>40</sup> Via co-occurrence analysis of keywords, we can determine prevalent themes in the CM for the AR domain. As shown in [Figure 12](#), we used CiteSpace software to plot the keyword co-occurrence graph, which shows 349 nodes and 1501 links. A keyword is represented as a node, and the size of the node indicates the frequency of the occurrence frequency of the keyword in this field. The larger the node, the more frequently the keyword appears. Obviously, it can be directly seen that “allergic rhinitis” has the highest occurrence frequency. The top 10 keywords in terms of co-occurrence frequency and centrality are shown in [Table 8](#). The most frequently used keywords are “allergic rhinitis (138)”, “asthma (63)”, “impact (60)”, “prevalence (37)”, and “Chinese herbal medicine (29)”. And the highest centrality is “asthma (0.28)”, suggesting that asthma is closely related to AR in the AR research field.

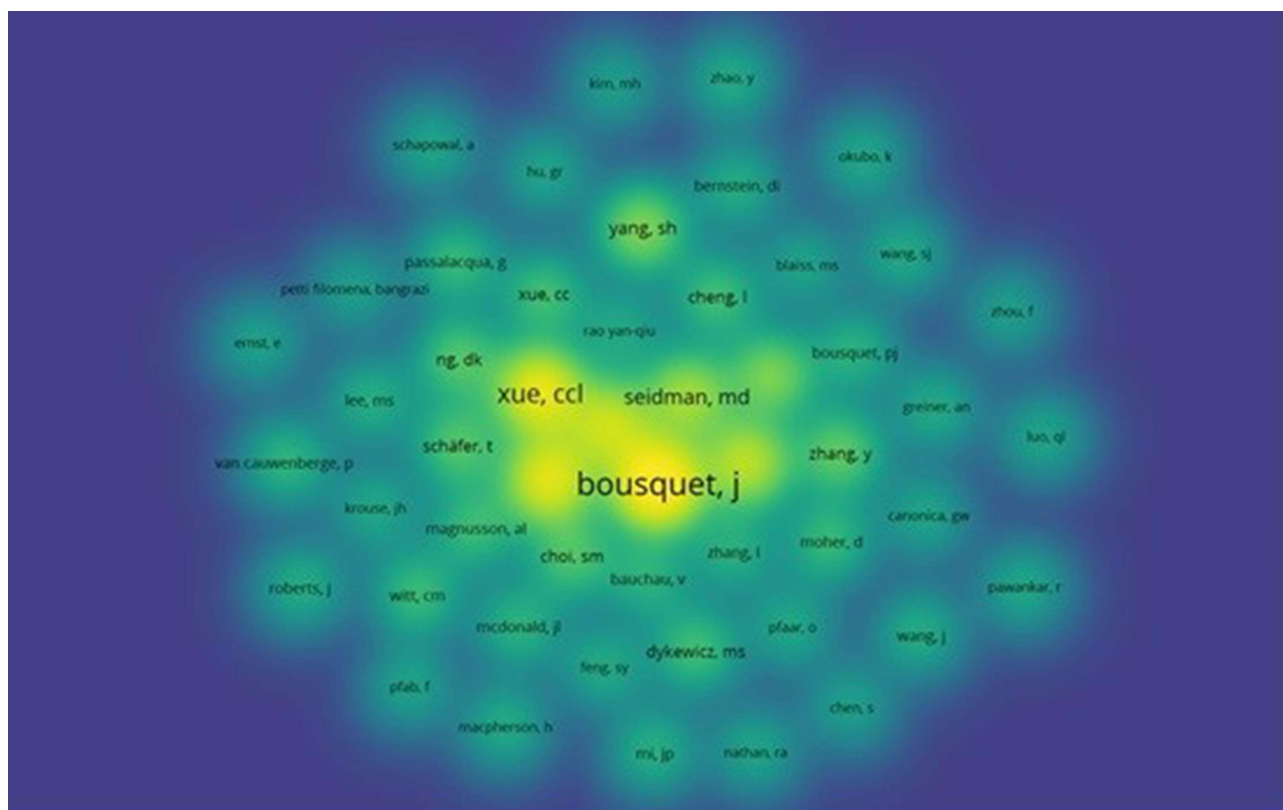


Figure 7 Density visualization map of co-cited authors related to CM for AR.

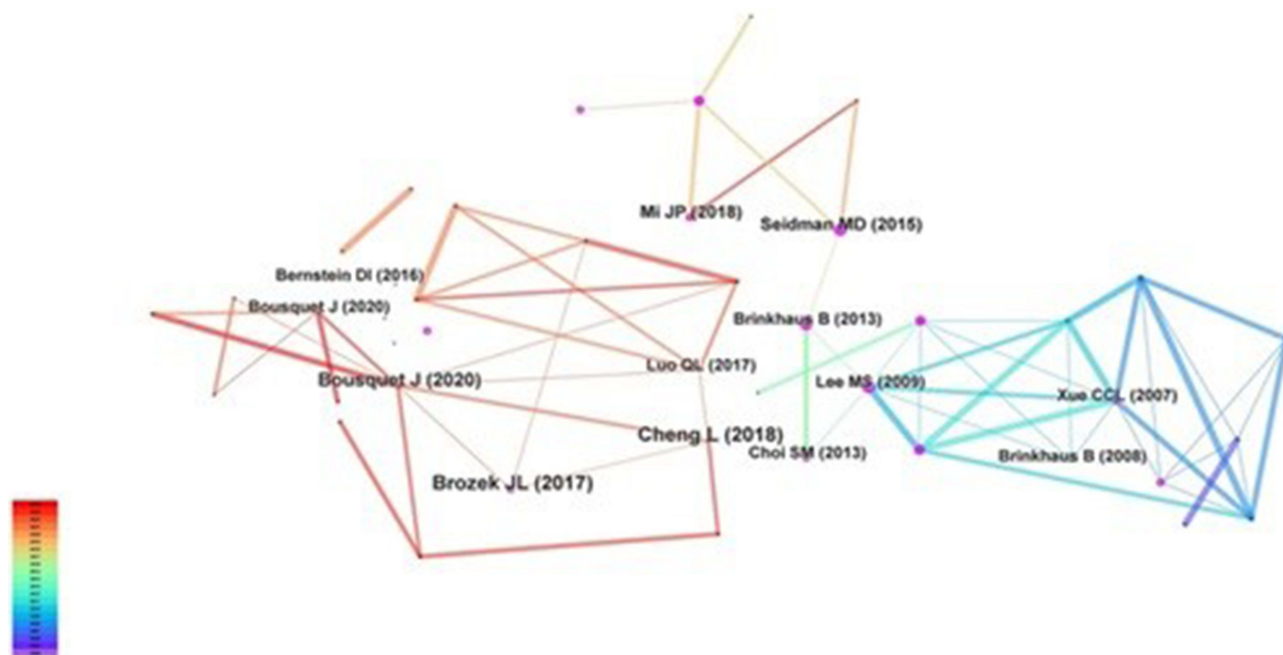


Figure 8 Map of co-cited references related to CM for AR.

**Table 5** Top 5 Co-Cited References Related to CM for AR From 2004 to 2024

RANK	Reference	Representative Author (Publication Year)	Counts	Centrality
1	Chinese Society of Allergy Guidelines for Diagnosis and Treatment of Allergic Rhinitis <sup>25</sup>	Cheng L (2018)	21	0.02
2	Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines-2016 revision <sup>26</sup>	Brozek JL (2017)	19	0.15
3	Allergic rhinitis <sup>27</sup>	Bousquet J (2020)	18	0.1
4	Clinical Practice Guideline: Allergic Rhinitis Executive Summary <sup>2</sup>	Seidman MD (2015)	13	0.46
5	Treatment of persistent allergic rhinitis via acupuncture at the sphenopalatine acupoint: a randomized controlled trial <sup>28</sup>	Mi JP (2018)	13	0.14

The clustering map of keywords offers a panoramic view of the study landscape within the domain, whereas the timeline map of the keywords clustering dynamically shows the temporal evolution of the most prevalent keywords within each cluster, rooted in their interconnected and evolving relationships.<sup>41</sup> The cluster map of co-occurrence keywords is shown in Figure 13. We obtained a total of 8 clusters, which are “meta-analysis”, “homeopathy”, “acupoint application”, “herbal medicine”, “network pharmacology”, “Chinese medicine”, “centipeda minima”, and “body constitution”. The cluster map drawn with CiteSpace has a modularity Q and silhouette S. In general, the modularity Q value falling within the range of [0, 1] and exceeding 0.3 signifies the importance of the structured associations that were plotted. A mean silhouette S value surpassing 0.7 indicates highly efficient and persuasive clustering. Conversely, when the mean silhouette S value exceeds 0.5, the clustering is typically regarded as acceptable or reasonable.<sup>42</sup> As shown in Figure 13, the modularity Q is 0.5471 and the silhouette S is 0.8132>0.7. Thus, we can consider this clustering to be highly reliable. On the basis of the clusters, we draw a time-line map of keywords related to CM for AR, which is listed in Figure 13. According to Figure 14, keyword clusters such as “meta-analysis”, “homeopathy”, and “acupoint application” appeared in 2004 and continue through 2024. These findings suggest that these findings are closely related to studies on the prevention and treatment of AR via CM in the past 20 years and need to be further explored.

Burst keywords refer to words with a sudden increase in citation frequency in a very short period, and these words are often regarded as weathervanes of emerging academic fields or research hotspots.<sup>43</sup> We plotted the top 15 keywords with the strongest citation bursts shown in Figure 15. The research hotspots in this area are centered on “Chinese herbal medicine”,

### Top 15 References with the Strongest Citation Bursts

**Figure 9** Top 15 references with the strongest citation bursts.

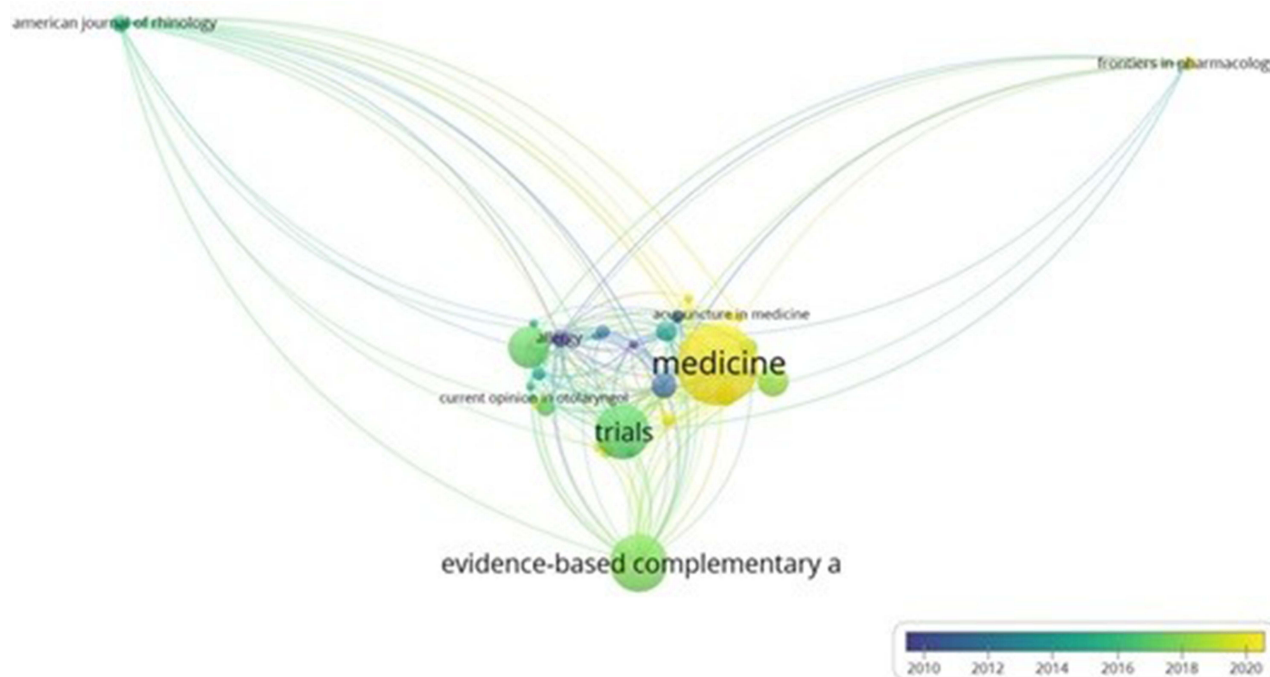
**Table 6** Top 10 Journals Related to CM for AR From 2004 to 2024

RANK	Journal	Counts	Citations	Total Link Strength
1	Medicine	24	38	62
2	Evidence-based Complementary and Alternative Medicine	16	159	80
3	Trials	15	135	109
4	Journal of Ethnopharmacology	11	232	49
5	Journal of Traditional Chinese Medicine	8	27	19
6	Annals of Allergy, Asthma & Immunology	6	255	111
7	BMC Complementary and Alternative Medicine	5	104	64
8	Chinese Medicine	5	36	40
9	Allergy	4	222	98
10	American Journal of Rhinology & Allergy	4	75	40

followed by “complementary”. In recent years, the burst keywords “systematic review”, “rhinoconjunctivitis”, and “management” have received increasing attention and are considered to be at the forefront of research on CM in the treatment of AR.

## Discussion

This study was a bibliometric analysis of 221 articles published between 2004 and 2024 on the use of CM in the treatment of AR, providing a new view of the trend in AR research. Despite the limitations of this study, it adequately demonstrates the global trend of CM for AR and presents it in the shape of a visualized knowledge map. According to the trends of annual publication outputs, research on CM for the treatment of AR has been broadly divided into two phases: a period of slow growth in the past (2004–2014) and a period of significant growth (2014–2024). Notably, publications peaked in number (28 articles) in 2022.



**Figure 10** Overlay visualization map of journals related to CM for AR.



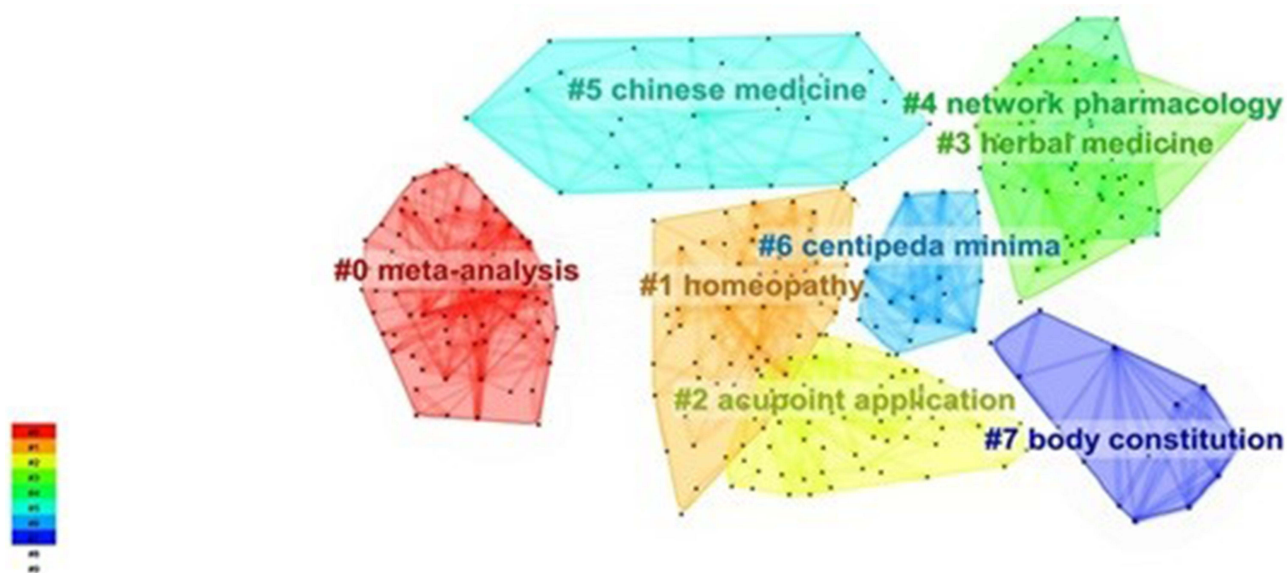


**Table 8** Top 10 Co-Occurrence Keywords Related to CM for AR From 2004 to 2024

RANK	Keywords	Count	RANK	Keywords	Centrality
1	Allergic rhinitis	138	1	Asthma	0.28
2	Asthma	63	2	Cells	0.21
3	Impact	60	3	Expression	0.17
4	Prevalence	37	4	Alternative MEDICINE	0.16
5	Chinese herbal medicine	29	5	Traditional Chinese medicine	0.15
6	Quality of life	26	6	Medicine	0.14
7	Alternative medicine	25	7	Double blind	0.14
8	Randomized controlled trial	24	8	Prevalence	0.13
9	Traditional Chinese medicine	24	9	Efficacy	0.12
10	Acupuncture	23	10	Impact	0.11

The main findings of scientific research are frequently published in academic journals, and information about the main journals in a field can be found by researchers by analyzing the distribution of journal sources.<sup>41</sup> As shown in Table 6 and 7, Medicine is the most widely published journal, with Evidence-based Complementary and Alternative Medicine and Trials following closely behind. And Allergy has the most citations for AR research, followed by the Journal of Allergy and Clinical Immunology and the Annals of Allergy Asthma & Immunology.

The keyword that is used most frequently is “allergic rhinitis”, followed by “asthma”, which suggests a research focus in the field of AR and asthma. “Asthma” is the keyword with the highest centrality. This could be due to the reality that AR is a frequent comorbidity of asthma and that AR and asthma share a similar pathogenesis.<sup>44</sup> As shown in the timeline map of keywords, in recent years, we know that attention has been increasingly directed towards the keywords with the strongest citation bursts, such as “systematic review”, “rhinoconjunctivitis”, and “management”, which are considered to be at the frontier of research investigating the use of CM in treating AR. According to Figure 13, we obtained a cluster map of co-occurrence keywords. The largest clustering is the “meta-analysis”, followed by “homeopathy”, both

**Figure 13** Cluster map of co-occurrence keywords related to CM for AR.



**Figure 14** Time-line map of keywords related to CM for AR.

**Notes:** The “#” symbol denotes cluster IDs (eg, #0 = largest cluster) for Figures 13 and 14.

## Top 15 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2004 - 2024
chinese herbal medicine	2004	3.91	2004	2008	
alternative medicine	2004	2.92	2004	2010	
double blind	2004	2.2	2004	2018	
controlled clinical trial	2007	2.9	2007	2014	
complementary	2008	3.52	2008	2013	
acupuncture	2013	3.23	2013	2017	
randomized controlled trial	2004	2.43	2014	2017	
multicenter	2014	2.3	2014	2015	
herbal medicine	2015	1.75	2015	2018	
medicine	2008	2.87	2019	2021	
impact	2009	2.6	2019	2020	
chinese medicine	2010	2.04	2019	2021	
systematic review	2017	3.41	2020	2024	
rhinoconjunctivitis	2004	2.52	2020	2024	
management	2007	2.72	2021	2024	

**Figure 15** Top 15 keywords with the strongest citation bursts.

spanning the period from 2004 to 2024. This suggests that these two clusters have been the focus of research in the field. As described in the previous section on keyword bursts, complementary therapies burst with the greatest intensity, leaving aside the subject of CM. Complementary therapies are a method of treatment and diagnosis that is not part of traditional medicine, but that complements and supports it, including mind-body medicine, distant healing, massage, tuina and tai chi, homeopathy, ginseng, and dietary supplementation.<sup>45</sup> Wagner, JG et al reported that  $\gamma$ -tocopherol ( $\gamma$ T), the primary form of dietary vitamin E, can prevent airway eosinophilia and mucous cell hyperplasia in experimentally induced AR and asthma.<sup>46</sup> Acupuncture therapy, as a complementary therapy, is widely used to treat AR. Through

precise stimulation of acupuncture points, it effectively relieves allergy symptoms such as nasal congestion and runny nose and promotes nasal health. As one study showed, patients with AR had significant reductions in several nonspecific pro-inflammatory cytokines in the nose and nasal symptom scores after receiving acupuncture.<sup>47</sup>

## Strengths and Limitations

Drawing upon the scrutiny of 221 articles within the WoSCC database, spanning two decades of CM interventions for AR, integrated with visualization clustering insights from CiteSpace and VOSviewer, we embarked on pioneering visual bibliometric analysis in this domain. This endeavor not only highlights the foremost nations, institutions, and authors that have shaped the landscape of the past two decades but also offers an impartial portrayal of contemporary research dynamics and emerging trends, thereby enriching the arsenal of references and foundations for future scholarly endeavors.

Limitations of this study include the lack of comprehensiveness of the data, as we only considered publications in the Web of Science Core Collection database and did not include data from Chinese databases, as well as other English databases. In addition, we discarded types of articles such as letters, meeting abstract, and editorial material, and selected only “articles” and “review articles” for analysis. Future research can further add to the relevant literature records by incorporating larger datasets.

## Conclusion

We explored the hotspots and frontiers of previously published papers on CM for AR by analyzing 221 articles from 2004 to 2024 using two software visualization tools: CiteSpace and VOSviewer. Overall, the body of literature on CM in AR has grown. Current research hotspots focus on “allergic rhinitis”, “asthma”, and “complementary and alternative therapies”. And “systematic review”, “rhinoconjunctivitis”, and “management” may be future research directions for CM in AR. In conclusion, our findings provide a solid foundation for future researchers and highlight effective research directions that warrant further exploration.

## Abbreviations

AR, Allergic rhinitis; CM, Chinese medicine; WoSCC, Web of Science Core Collection.

## Data Sharing Statement

The data in this paper can be obtained from the corresponding author.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors have no conflicts of interest to declare in this work.

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