



# Bibliometric Analysis of Traditional Chinese Medicine in the Treatment of Asthma from 2005 to 2024

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**Abstract:** Asthma is a complex chronic respiratory disease that affects most people worldwide and imposes a heavy economic and health burden. Traditional Chinese medicine (TCM) is one of the common treatments for asthma; however, there is a lack of bibliometric analysis data on the relationship between bronchial asthma and traditional Chinese medicine. This study analyzes and visualizes current research status and future trends. Relevant English publications on traditional Chinese medicine treatment for bronchial asthma were collected from the Web of Science core collection, and bibliometric analysis was conducted using software like Histcite. A total of 406 articles meeting the criteria were included after manual screening. China (including Taiwan) emerged as the leading contributor, with the Beijing University of Chinese Medicine being the institution with the highest number of publications. 'Journal of Ethnopharmacology' was a significant publication in this domain. The most frequently occurring keyword on the main display platform was 'airway inflammation.' Future research hotspots are expected to focus on intestinal flora and metabolism. This research offers a fresh perspective for understanding developments in this field.

**Keywords:** asthma, traditional Chinese medicine, acupuncture and moxibustion, literature metrology, CiteSpace

## 1. Introduction

Asthma is a chronic airway disease characterized by inflammation and airway hyperresponsiveness. This disease is influenced by genetics, environment, and biology. Symptoms often include wheezing, difficulty breathing, coughing, and, in severe cases, suffocation, leading to death. Despite global efforts, the prevalence of asthma remains high, with an estimated 358 million affected individuals worldwide[1]. Some regions have seen a steady increase in asthma cases[2]. This condition significantly impacts both the physical and mental well-being of patients and poses a substantial burden on society.

TCM treatment is a practical approach for managing asthma, demonstrating positive therapeutic outcomes in clinical settings. This treatment modality operates through various pathways and targets, making it a unique and valuable option for asthma management.

Bibliometrics is a research method that utilizes mathematics and statistics to perform scientific quantitative analysis of documents. This approach allows for a clear understanding of trends in publication volume on a specific topic, as well as the geographical distribution and research trends[3]. To date, no bibliometric study has systematically examined the correlation between asthma and TCM treatment. Hence, this study employs this methodology to investigate this subject, aiming to offer valuable insights for researchers in this area.

## 2. Materials and Methods

### 2.1 Data acquisition and screening

In the WOSCC database, the search formula is set as follows. ((TS=(asthma)) OR TS=(bronchial asthma)) AND TS=(Traditional Chinese Medicine OR TCM OR Traditional Medicine, Chinese OR Chinese Medicine, Traditional OR Medicine, Chinese Traditional OR Chinese herbal medicine OR Drugs, Chinese Herbal OR Chinese patent drugs OR classical prescriptions OR proved recipes OR decoctions OR Chinese medical formula OR (Syndrome AND TCM) OR (Syndrome Differentiation AND TCM) OR integrated traditional Chinese and Western medicine), Article types were article and Review, and the language was set to English. Screening conducted by two scholars simultaneously, inconsistent results were discussed to solve. All of the screening work was finished on July 4, 2024, and the final results were in plain text file export.

## 2.2 Data analysis

Four tools were used in this study: CiteSpace (6.1.R6), HistCite Pro (2.1), VOSviewer (1.6.20), and Microsoft Office Excel 2016.

## 3. Results

### 3.1 Analysis of Screening Results and Number of Articles Published

Based on the search strategy, 1007 articles were initially identified as eligible. Following manual screening to remove irrelevant articles, a total of 406 articles remained, with 359 being categorized as Article type and 47 as Review type. The distribution of articles over time is illustrated in Figure 1, indicating a general upward trend from 2005 to 2021, with a slight decline in the most recent two years.

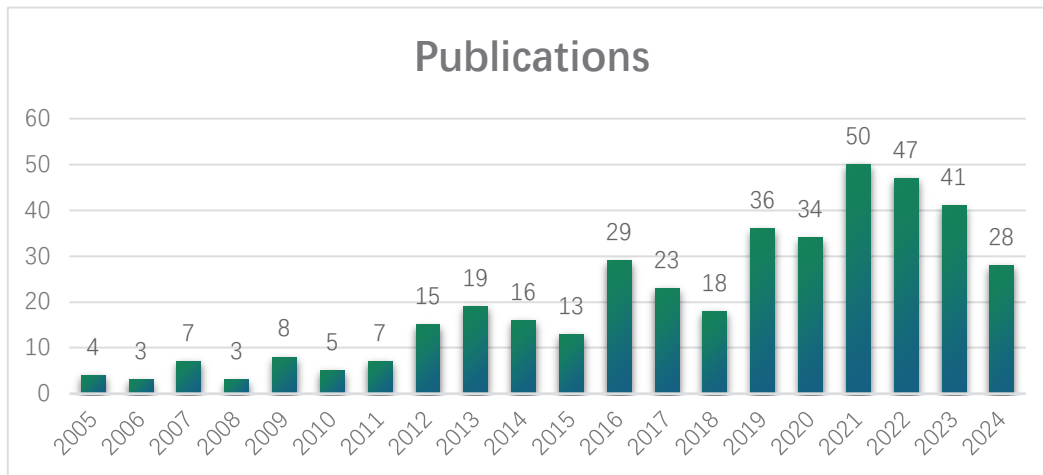


Figure 1. Trends in the number of articles published in research on TCM and asthma

### 3.2 Country and Institution Analysis

The analysis from Table 1 reveals that China (including Taiwan) leads in the number of publications in this particular field, with the highest total citations and H-index compared to other countries. Following China are the United States and South Korea. In Figure 2, the data illustrates the research institutions involved in this topic, where the circle size indicates the number of publications and the line thickness signifies the level of cooperation. The top three institutions are Beijing University of Traditional Chinese Medicine (33 articles), Nanjing University of Traditional Chinese Medicine (32 articles), and Shanghai University of Traditional Chinese Medicine (24 articles). The Beijing University of Traditional Chinese Medicine and Chang Gung University exhibit significant collaboration intensity.

Table 1. Top 5 countries with the highest number of publications.

Rank	Country	Publications	H-index	Total citations
1	China (including Taiwan)	366	32	4180
2	United States	30	15	984
3	South Korea	9	7	175
4	Australia	8	5	100
5	Brazil	4	3	34



Figure 2. Co-occurrence analysis of TCM and asthma research organizations

### 3.3 Analysis of Magazines and Journals

The research articles on the topic were included in 146 journals. The JOURNAL OF ETHNOPHARMACOLOGY emerged as the primary platform for disseminating research ideas in this topic area, with 47 articles published. This was followed by EVIDENCE-BASED COMPLEMENTARY AND ALTERNATIVE MEDICINE and MEDICINE, which had 43 and 19 articles on the subject, respectively.

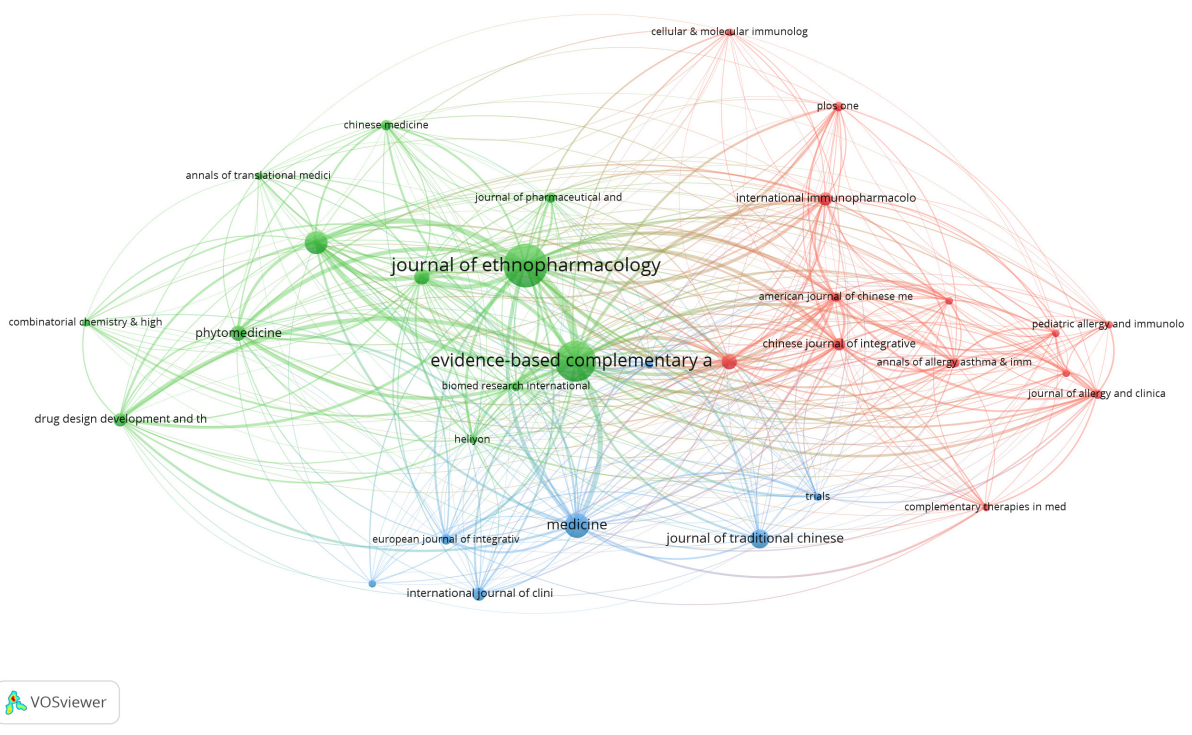


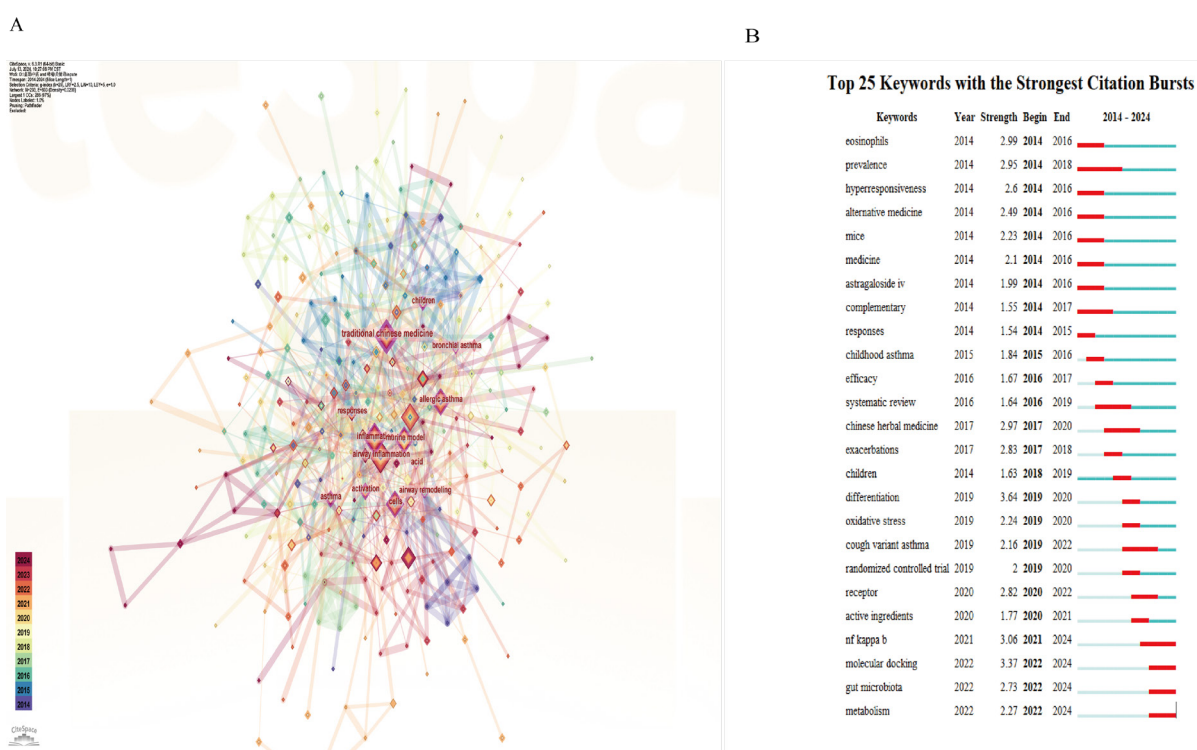
Figure 3. Analysis of journal co-occurrence of TCM treatment and asthma research

### 3.4 Keywords and hotspot analysis

Keywords can briefly summarise the topics of research activities in the field. Table 2 and Figure 4A show that "airway inflammation" occurs most frequently, followed by "expression" and "inflammation." "inflammation." Figure 4B shows the analysis of keyword bursts, which represents the increase in interest in a particular hotspot over time, with the red color indicating its duration. The results show that "prevalence" is the earliest and longest-lasting outbreak keyword, "differentiation" is the strongest outbreak keyword, and "nf kappa b," "molecular docking," "gut bacteria," and "metabolism" are the most recent new outbreaks. "nf kappa b," "molecular docking," "gut bacteria," and "metabolism" are the most recent terms to break out, and this has continued to the present and will continue for some time to come.

**Table 2. The top 20 keywords in the study of TCM treatment and asthma**

Rank	Keywords	Times	Rank	Keywords	Times
1	airway inflammation	78	11	activation	23
2	expression	61	12	asthma	22
3	inflammation	58	13	children	20
4	traditional Chinese medicine	54	14	airway remodeling	19
5	allergic asthma	53	15	inhibition	17
6	cells	49	16	mice	17
7	murine model	33	17	Pathogenesis	17
8	network pharmacology	27	18	mouse model	15
9	responses	26	19	nf kappa b	14
10	bronchial asthma	24	20	allergic airway inflammation	13



**Figure 4. A. Keyword co-occurrence network diagram. B. Top 25 outbreak keywords.**

## 4. Discussion

In this study, the literature on TCM treatment for asthma was initially searched in the WOSCC database using a specific strategy. Bibliometric analyses were then conducted to reveal insights into relevant research. The findings indicated that China (including Taiwan) made the highest contribution, with the leading H-index and total citations compared to other countries. This could be attributed to China being the birthplace of TCM and receiving financial and policy support from the government. The number of publications on TCM therapies for asthma has increased from 2005 to 2021, suggesting a growing interest in this area. However, the annual publication count has not exceeded 100, indicating more research efforts are needed. Most institutions involved in this research are based in China, with Beijing University of Traditional Chinese Medicine being a prominent research institution. It is important to note that limited inter-institutional collaboration may hinder the field's progress. Institutions should strengthen domestic and international partnerships to support the field's continuous development.

Among the journals, the JOURNAL OF ETHNOPHARMACOLOGY stands out as the most popular choice among researchers in this field. This journal is dedicated to facilitating the exchange of information and understanding regarding using plants, fungi, animals, and other biological elements in pharmacology. Notably, the top 3 journals in terms of article

publication have relatively low impact factors, not exceeding 5. This suggests that TCM therapy has not yet gained widespread recognition and remains poorly understood globally. This underscores the importance of researchers focusing on gathering evidence of the therapeutic benefits of TCM therapy and advocating for its advancement in future research endeavors for the betterment of humanity.

From the perspective of the top 20 most frequently appearing keywords, these words can be roughly categorized into two groups. The first group pertains to the nature and mechanism of asthma, including keywords like 'airway inflammation,' 'inflammation,' and 'allergic asthma.' The second group focuses on the research methodology of TCM treatment for asthma, such as 'the murine model' and 'network pharmacology.' This indicates that research on the mechanisms of asthma and experimental studies are the current research hotspots in this field. In terms of keyword outbreaks, "nf kappa b," "molecular docking," "gut bacteria," and "NF-KappaB are critical transcription factors in the development of asthma and promote the synthesis of various cytokines, adhesion molecules, chemokines, growth factors, and enzymes that trigger airway inflammation[4, 5]. Studies have shown that NF-KappaB levels are significantly higher in asthma patients and animal models of asthma than in regular groups. That blockade of this pathway results in alleviating inflammation. Molecular docking is a routine tool in network pharmacology research that can predict the binding affinity of a drug to its target. It has a vital role in the development of new medicines as well as in drug screening and prediction of drug side effects. Therefore, many scholars have resorted to this method to find herbal medicines for the treatment of asthma, and it is a promising tool for a wide range of applications. Gut flora has recently been recognized as a significant factor that can impact human health. Research has indicated a correlation between dysbiosis of gut and lung microorganisms and asthma[6]. Some studies have shown that individuals with asthma have a higher presence of histamine-secreting flora in their fecal matter than non-asthmatics[7]. Moreover, asthmatic children have been found to have reduced levels of specific flora like Veillonella, Faecalibacterium, and Rothia, with notable improvements in airway inflammation observed after supplementing these flora[8]. Furthermore, research suggests that herbal medicines such as Gu-Ben-Fang-Xiao Decoction and Shaoyao-Gancao-Tang have shown promise in improving asthma by modulating the microbiota-acetic acid-Tregs axis and balancing the abundance of beneficial flora respectively[9] [10]. These findings provide compelling evidence for herbal medicine's potential in treating asthma. Metabolic disorders have been shown to impact the progression and manifestation of asthma[11-13], particularly lipid metabolism. Jiang et al. discovered that asthma patients exhibited significantly elevated levels of triglycerides, ceramides, and phosphatidylinositol compared to healthy individuals. These differences were strongly associated with the severity of asthma and IgE levels[14]. Furthermore, specific lipid metabolites can influence asthma by modulating cell types such as T, B, and mast cells [11]. Some Chinese medicines like Huanglong Zhencheng granules [15] and Ephedra polysaccharides [16] have demonstrated the ability to alleviate airway inflammation in asthmatic individuals by regulating lipid metabolism and increasing the concentration of short-chain fatty acids. In summary, the effectiveness of TCM in managing asthma has been partially confirmed, and further research is warranted to delve deeper into the mechanisms for potential new insights into asthma treatment.

This study also has some limitations. The data source was limited to the WOSCC database, and only studies in English were included, which can leave out some research results from other countries.

## 5. Conclusion

This study provides a more complete and scientific summary of the research on TCM and asthma. It systematically demonstrates the current research status and the development trend in this field, which provides valuable references for researchers.

## Author contributions

JL Huang carried out the topic conception, data collection, screening, data analysis, and paper writing; CY Li carried out data collection, screening, and checking of the manuscript; EP Li and Y Liu carried out part of the data analysis, and MS Lei was responsible for checking and revising the manuscript.

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