

Research Hotspots and Current Status of Xiaoqinglong Decoction—Visualization and Analysis Based on Vosviewer and Citespace

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Abstract: In order to analyze the current status of research with Xiaoqinglong Decoction in the last 20 years. We retrieved research literature on Xiaoqinglong Decoction included in the CNKI database from 2003 to 2023, used VOSviewer and CiteSpace software to analyze the cooperation between authors and institutions. And we conducted co-occurrence analysis, cluster analysis, sudden word analysis, and keyword time zone analysis on keywords in this field, drew a visual graph. The results included a total of 1230 articles, with 91 core authors, represented by He Liqing as a high-yield author; Hot keywords include Xiaoqinglong Tang, clinical efficacy, clinical application, adverse reactions, clinical observation, asthma, cough, etc. The keywords can be divided into 13 clusters, with a total of 25 emergent words extracted. In conclusion, the overall number of articles published in the research field of Xiaoqinglong Decoction is on the rise. The clinical efficacy of Xiaoqinglong Decoction is currently a research hotspot, and its mechanism of action is at the forefront of research.

1. Introduction

Xiaoqinglong Decoction comes from treatise on Febrile Diseases by Zhang Zhongjing : "People who have a cold, and there is water in the stomach, retch, have fever and cough, or are thirsty, or short of breath, or have bad urination, abdominal distension, or asthma, use Xiaoqinglong Decoction . " The prescription is composed of ephedra, Paeonia lactiflora, asarum, dried ginger, licorice, Ramulus Cinnamomi, Schisandra chinensis and Pinellia ternata. The cold is not cured, and the water in the epigastrium suggests that the exterior cold and interior water syndrome treated by Xiaoqinglong Decoction belongs to the combined disease of Taiyang and Taiyin [1]. Xiaoqinglong decoction is widely used. At present, it is often used in respiratory diseases such as asthma [2], bronchitis [3], chronic obstructive pulmonary disease [4], cough variant asthma [5], allergic rhinitis [6], skin related diseases such as urticaria [7], cardiovascular diseases such as chronic heart failure [8]. Experimental studies have found that Xiaoqinglong decoction has good anti allergic, anti-inflammatory, cough and asthma relieving effects [9].

In recent years, the literature about Xiaoqinglong decoction has been published gradually. In order

to understand the development process of Xiaoqinglong decoction, the number of papers published by the authors, the cooperation situation and the research hotspots and frontiers in this field, we used the bibliometric research method, used vosviewer and CiteSpace software to visually analyze Xiaoqinglong Decoction, in order to explore the research hotspots and frontiers in this field, and provide ideas for further scientific research.

2. Data and Methods

2.1. Data Sources

We took CNKI as the retrieval database, the key word was set as "Xiaoqinglong Decoction". The Chinese literatures from July 2003 to July 2023 were retrieved, and a total of 1995 literatures were retrieved.

2.2. Literature Screening

2.2.1. Inclusion criteria

Literature research related to Xiaoqinglong decoction were included.

2.2.2. Exclusion criteria

(1) Newspapers, meeting notices, patents, health science popularization, master's and doctoral thesis were excluded;

(2) The literature with title, abstract and content unrelated to Xiaoqinglong decoction were excluded;

(3) Republished literature was excluded.

After screening, 1230 literatures were included.

2.3. Data Conversion

1230 papers were exported from CNKI in refworks format for visual analysis by VOSviewer1.6.19 software and CiteSpace6.2.r2 software.

2.4. Parameter Setting

Vosviewer software data setting, analysis type: author cooperation, organization cooperation; Counting method: complete counting; Threshold selection: the minimum number of authors is 3 and the institution is 2; Other parameters are the software default settings.

We set up CiteSpace software data. The first literature included was published in 2003, so the time partition was set from July 2003 to July 2023, and each year was one time slice. Node type: keyword, author; We selected "k=25" for threshold item; The cutting method was selected according to the visualization map.

3. Results

3.1. Analysis Of Published Documents

From July 2003 to July 2023, there were 1230 literatures related to Xiaoqinglong decoction. Since 2005, the number of papers published each year has fluctuated and increased, indicating that Xiaoqinglong decoction has been paid attention by researchers, which also marks that the research of

Xiaoqinglong decoction is becoming more and more mature. Until 2021, the number of papers published in this field reached a peak, accounting for about 9% (111/1230) of the number of papers published in the past 20 years. The regression equation can be obtained by linear regression fitting of the number of published document: $y=4.897x-9795$, $R^2=0.8146$. When R^2 is closer to 1, it indicates that the greater the goodness of fit, the higher the degree of interpretation of the independent variable to the dependent variable, so the literature in this field will still show a linear upward trend in the future [10]. (see Figure 1). This study only counted the number of papers published in 7 months in 2023, so it did not participate in the trend analysis of the number of papers published in 2023.

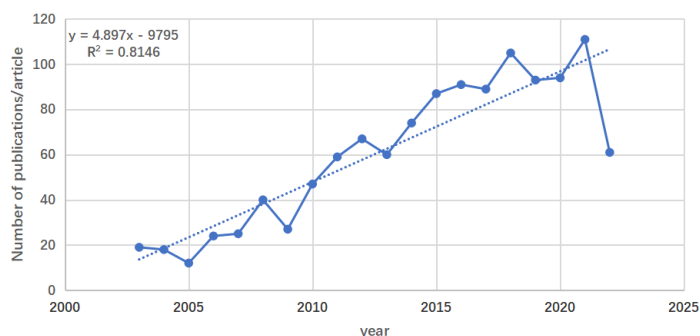


Figure 1: Trend chart of Xiaoqinglong decoction from 2003 to 2023

3.2. Analysis Of Research Authors

By analyzing the authors, we can obtain the core research strength and high productivity authors in this research field. According to price's Law: $m=0.749 \times \sqrt{N_{max}}$, calculated as $M \approx 3$, so the authors with more than 3 papers (including 3 papers) are designated as the core authors in this field, with a total of 91 people and a total of 363 papers, as shown in Figure 2. The atlas shows that the number of core authors is relatively small, indicating that the research in this field needs further development and breakthrough. Among the high productivity authors, heliqing has the largest number of published papers. From 2013 to 2023, He Liqing published a total of 12 papers and obtained 108 citations. According to the analysis of published papers, the scholar paid more attention to the metabonomic study of blood [11], urine [12] and lung tissue [13] in rats with Xiaoqinglong Decoction syndrome, providing objective basis for the clinical diagnosis and treatment of Xiaoqinglong Decoction syndrome. (Table 1)



Figure 2: Co-occurrence of authors of Xiaoqinglong Decoction related research

Table 1: Frequency of publications by core authors of studies related to tonifying Zhongyiqi Tang, 2003-2023

Serial number	Author	Frequency(articles)
1	He Liqing	12
2	Song Guihua	8
3	Yu Zhou	8
4	Yang Xiangzheng	8
5	Xue Hanrong	8
6	Wang Shupeng	8
7	Ruan Yan	8
8	Zhang Yan	7
9	Yang Ze	7
10	Fan Liang	7

3.3. Institutional Analysis

Among 1243 document issuing institutions, there are 5 clusters of institutions with cooperative relationships formed by institutions with more than 2 documents, as shown in Figure 3. It can be seen from the map that the cooperation among the internal institutions of each cluster is relatively small, and the cooperation among different cluster institutions also has shortcomings. See Table 2 for organizations with more than 10 published papers. It can be seen from the map that the main research force in this field is the large and medium-sized medical colleges and universities. However, the lack of mutual cooperation among colleges and universities is not conducive to the research and development of Xiaoqinglong decoction.

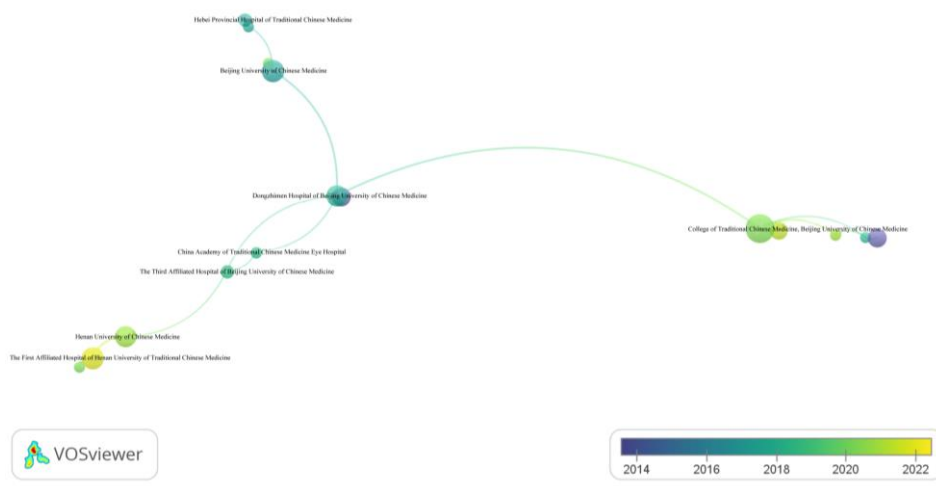


Figure 3: Co-occurrence of research organizations related to Xiaoqinglong Decoction

Table 2: Frequency of document issuing agencies from 2003 to 2023 (≥ 10)

Serial number	Organization	Frequency(articles)
1	Chengdu University of Traditional Chinese Medicine	16
2	Shanxi College of Traditional Chinese Medicine	14
3	Beijing University of Chinese Medicine	13
4	Liaoning University of Traditional Chinese Medicine	12
5	Shandong University of Traditional Chinese Medicine	11

3.4. Keyword Visualization Analysis

3.4.1. Keywords Co-occurrence

Keyword co-occurrence analysis can identify the development trends and research hotspots in this field in recent years, and is one of the ways to track the development of science [14]. First, merge synonymous keywords to make statistics more accurate and standardized. For example, "acupoint application" and "acupoint application", "traditional Chinese medicine therapy" and "traditional Chinese medicine treatment", "traditional Chinese medicine treatment" and "traditional Chinese medicine therapy" are combined. This study uses "Keywords" as the node and cite space6.2.r2 software to draw the keyword co-occurrence map (see Figure 4). The number of nodes $n=504$, the connection $e=708$, the density=0.0056, the node size indicates the frequency of its occurrence, and the connection between nodes indicates that there is a connection between the two. Among the 504 keyword nodes, Xiaoqinglong decoction had the highest frequency (993), followed by clinical efficacy, asthma, lung function, cough and other high-frequency keywords for the study of Xiaoqinglong decoction.

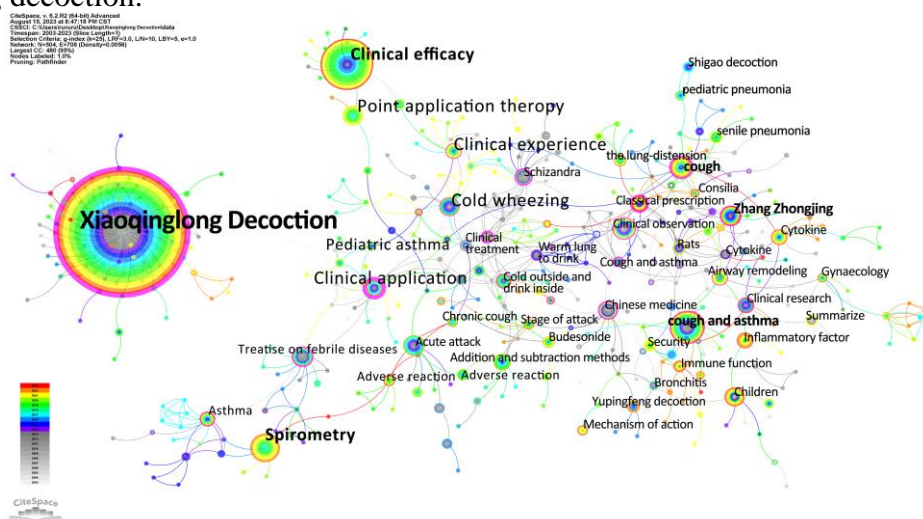


Figure 4: Keyword collinear map

3.4.2. Keyword Clustering

On the basis of the keyword co-occurrence map, the keyword clustering map of Xiaoqinglong decoction was obtained by keyword clustering analysis, as shown in Figure 5. The modular index Q value is $0.8467 > 0.8$, and the contour value s is $0.9681 > 0.8$, indicating that the clustering structure is reasonable, the effect is significant, and the reliability is high [15]. According to the cluster analysis chart, there are 14 clusters, including #0 Xiaoqinglong decoction, #1 rats #2 schizandra, #3 bronchitis, #4 acute attack, #5 warm lung to drink, #6 wheezing, #7 cough, #8 children, #9 aminophylline, #10 data mining, #11 clinical application, #12 adverse reaction, #13 cold drink.

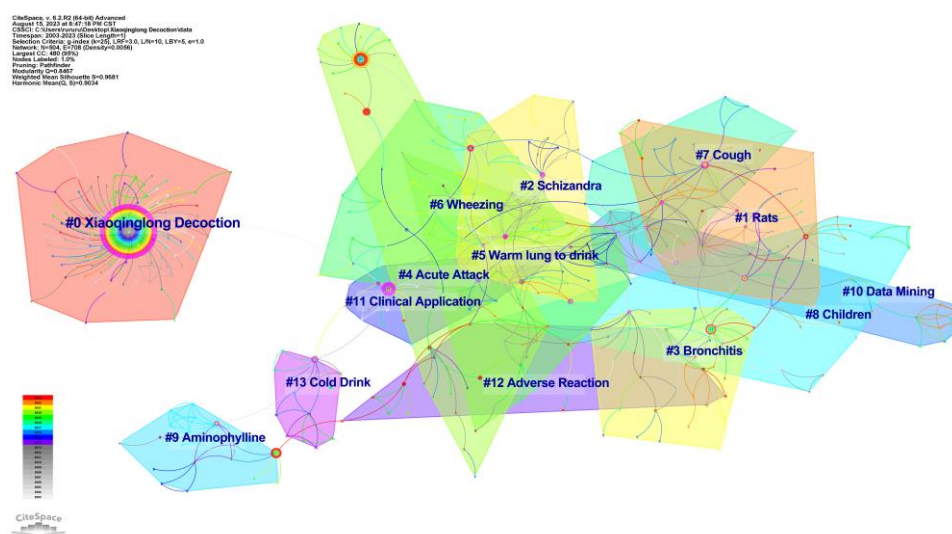


Figure 5: Cluster analysis of Xiaoqinglong Decoction

4. Discussion

4.1. The basic situation of Xiaoqinglong Decoction research literature

The literature on Xiaoqinglong Decoction showed an overall upward trend, reflecting the increasing attention in this field, with the largest number of papers published in 2021 (111). There are 91 core authors in this field, but the proportion is relatively small, indicating that the research in this field needs further development and breakthrough. Among them, the author with high productivity is represented by Professor heliqing, but a large-scale academic team has not been formed and has not been able to carry out research better. The cooperation of various research institutions also mostly exists in universities and affiliated hospitals, and researchers and institutions in different regions lack communication and cooperation.

4.2. Research Hotspots

The main research hotspots were bronchitis, chronic obstructive pulmonary disease, asthma, pneumonia, cough, etc; There are various research methods, such as data mining, clinical research, experimental research, etc., mainly discussing its mechanism of action, clinical efficacy and clinical experience. The research focuses on airway remodeling, inflammatory factors, immune function, cytokines and so on. Traditional Chinese medicine research involves many aspects, such as addition and subtraction methods, famous experts' experience, point application therapy, dialectical treatment and so on.

4.3. Research Frontiers and Trends

Words with high emergence intensity at a certain stage represent the frontier fields at this stage [16]. According to the analysis of keyword emergence, the word "clinical efficacy" is the research frontier in this field. Xiaoqinglong decoction has a good clinical effect on a variety of lung diseases, can improve the immune function and airway remodeling of patients with asthma, and can significantly alleviate the lung function and inflammatory reaction of patients with chronic obstructive pulmonary disease [17].

4.4. Summarize

By using CiteSpace and vosviewer software, the research literature on Xiaoqinglong Decoction in CNKI database was visually analyzed, and the research status, research hotspots and research frontiers in this field in the past 20 years were visually displayed. However, CiteSpace and vosviewer software cannot combine multiple databases for analysis at the same time [18]. Therefore, only CNKI, which has the largest number of publications, is selected for analysis. The data information is not complete enough, so the results may be affected to some extent.

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