

Practical Application and Development Trend of External Treatment of Zhuang Medicine Based on CiteSpace

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Abstract The external treatment of Zhuang medicine is a treatment method commonly used from outside the human body. The advantages of external treatment methods are easy operation and small side effects. People are more familiar with medicated thread moxibustion, meridian tendon massage, and acupuncture therapy of Zhuang medicine. Although the curative effect of external treatment is significant, it is little known due to insufficient publicity and other factors. The purpose of this project was to comprehensively analyze and organize the latest relevant scientific and technological literature graphs in the study on clinical external treatment of Zhuang medicine using CiteSpace software and adopting the research method of visual literature graph search. Current research status and research development process of the external treatment of Zhuang medicine in Chinese literature were summarized, which has been able to present the current trends and future research prospects of the development and research of external treatment of Zhuang medicine in China in detail and comprehensively. Finally, 307 papers were selected and included. Wei Yingcai and Pang Yuzhou were the authors with the largest number of documents and had formed a stable core research team. The analysis showed that Guangxi University of Chinese Medicine published the largest number of research documents, and there was less cooperation between institutions. At present, the research on the external treatment methods of Zhuang medicine is still in the development stage, which provides ideas and reference for quickly mastering the research hotspot of the external treatment method.

Key words External treatment of Zhuang medicine; Visual analysis; CiteSpace; Knowledge map

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The external treatment of Zhuang medicine, belonging to traditional medicine, study the laws of human life activities and disease diagnosis, treatment and prevention based on the theory and practical experience of Zhuang medicine, combined with some traditional Chinese medicine theories. In current clinical diagnosis, as the representative treatment method of Zhuang medicine in China, the external treatment of Zhuang medicine is one of the most widely used treatment techniques at present. Its main characteristics are "simple and easy operation, low cost, easy learning, high safety, and green and environmental protection". It has special efficacy in treating some diseases, and Zhuang medicine has unique advantages in treating dermatological diseases. There are a total of seventeen treatment methods for Zhuang medicine surgery. This paper focused on the treatment and efficacy of three therapies: medicated thread moxibustion, meridian tendon therapy of Zhuang medicine, and acupuncture therapy of Zhuang medicine for common diseases in modern medicine. At present, literature on external treatment of Zhuang medicine is still relatively scarce, and related research is still in the development stage.

CiteSpace is a scientific information visualization software developed by the team of renowned Chinese – American scholar Chen Chaomei working for an American company. Its source code is written based on the open source Java programming language, and the main purpose is to measure the quality of various scientific

literature data and perform collection and analysis of Big data in real time to fully display the frontier research and information panorama in science-related knowledge fields in an intuitive form of a scientific knowledge graph, so as to more easily, quickly and deeply understand new classic literature, hot research directions and discipline frontier directions in the development of a scientific field. At present, the research results have been widely applied in theoretical research related to various major disciplines in society. The purpose of this project was to comprehensively analyze and organize the latest relevant scientific and technological literature graphs in the study on clinical external treatment of Zhuang medicine using CiteSpace software and adopting the research method of visual literature graph search. Current research status and research development process of the external treatment of Zhuang medicine in Chinese literature were summarized, which has been able to present the current trends and future research prospects of the development and research of external treatment of Zhuang medicine in China in detail and comprehensively. This study provides a new development framework and various possible technical reference basis for exploring the future important research directions of the external treatment in Zhuang medicine, and promotes more in-depth and detailed research on the external treatment of Zhuang medicine, in order to better serve clinical applications.

Information and Analysis

Data sources and analysis

Document retrieval was carried out mainly using China's CNKI database. The selected papers mostly involved major technologies related to pharmaceutical technology or medical and health technologies both domestically and internationally. When the subject word or keyword in the keyword strategy or the keyword in the paper title strategy was determined as "medicated thread

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moxibustion of Zhuang medicine", and the search cycle lasted from January 1, 2012 to December 31, 2022 in the Gregorian calendar, a total of approximately 162 relevant important papers both domestically and internationally were available. When the subject word or keyword in the keyword strategy or the keyword in the paper title strategy was determined as "acupuncture of Zhuang medicine" and the search period was determined to be from January 1, 2012 to December 31, 2022, a total of approximately 56 papers were retrieved. When the subject word or keyword in the keyword strategy or the keyword in the paper title strategy was determined as "meridian tendon therapy of Zhuang medicine" and the search period was from January 1, 2012 to December 31, 2022, a total of approximately 231 papers were retrieved. Next, through comprehensive screening and elimination of relevant documents that duplicated the content of relevant information and that had not been officially published publicly, and relevant documents, conference abstracts, news and newspapers published with the same subject information without other information, it was finally determined that a total of 307 subject documents were included in the effective database of the subject literature.

Research methods

The currently selected Chinese documents were exported in the "Refworks" format in CNKI, renamed as "download_*.txt", and imported into CiteSpace 6.1.3 for format conversion and visual analysis. The analysis was carried out according to following settings: time slicing: Chinese documents 2012 – 2022, years per slice; 1 year, term source: all default, and author, organization and keywords in node types: top N per slice = 25.

Data visualization

After the set parameters were confirmed to be correct, the 307 imported Chinese papers on external treatment of Zhuang medicine were analyzed on the trend of paper published, authors' cooperation network, and institutions' cooperation network. Keyword co-occurrence analysis, cluster analysis and emergence analysis were carried out, and the knowledge graphs of related research on the external treatment of Zhuang medicine were produced. And based on software prompts, combined with manual reading and information integration, detailed analysis of the graph information was conducted.

Results and Analysis

Trend of publication

The publication trend of Chinese documents related to external treatment methods of Zhuang medicine in the past year was analyzed, as shown in Fig. 1. The trend of paper published could be divided into several stages. Overall, the period from 2011 to 2013 was a period of rapid growth in the number of published papers, and 41 papers were published in 2013. This stage was the development period of modern research on external treatment of Zhuang medicine. The number of papers published in 2014 slightly decreased compared with the previous year, but an increasing trend was observed from 2014 to 2016, and 44 papers were published in

2016. Although the number of papers published from 2017 to 2018 decreased, there was still an increasing trend. In 2018, the number of papers published was 51, reaching the peak within a decade. From 2019 to 2021, the number of papers published continued to steadily increase, and in 2022, the number began to decrease, which indicated that there had been certain achievements in the research on external treatment of Zhuang medicine, and it could be inferred that the number of papers published in 2023 will show a downward trend. The data showed that the total number of papers published at home in the past decade exceeded 300, indicating that the research on external treatment of Zhuang medicine in China has made some progress overall.

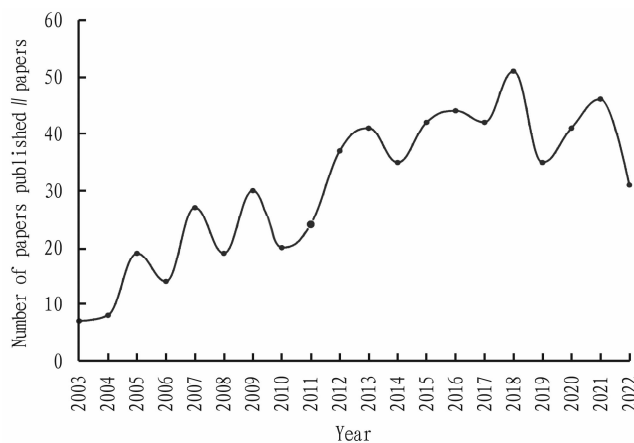


Fig. 1 Annual distribution of papers published on external treatment of Zhuang medicine

Analysis of authors' cooperation network

Among the 307 paper studied, there were 272 authors, with Wei Yingcai and Pang Yuzhou having the highest cumulative number of published papers, 12 each. Lin Chen published 11 paper. Tang Hongliang published 9 papers. Lyu Jibao published 8 papers. Tang Hanqing published 6 papers. The results are shown in Table 1.

Table 1 Authors with more than 5 papers published on external treatment of Zhuang medicine

Author	Number of papers published
Wei Yingcai	12
Pang Yuzhou	12
Lin Chen	9
Tang Hongliang	8
Tang Hanqing	6

The cooperation network for authors publishing papers on external treatment of Zhuang medicine was visualized and analyzed. A larger node means that the analysis object appeared more frequently. The lines between nodes represented co-occurrence relation, and a thicker line indicated a stronger co-occurrence relation, as shown in Fig. 2. The results showed that there was a cooperative relationship between mid- to high-yield authors and several stable research teams had been formed. Among them, the research team of external treatment of Zhuang medicine with Pang

Yuzhou as the core mainly focuses on the therapeutic effects of medicated thread moxibustion and acupuncture of Zhuang medicine on migraines^[2-6]. The research team of external treatment of Zhuang medicine with Wei Yingcai as the core mainly focuses on the therapeutic effects of meridian tendon therapy of Zhuang medicine on stroke^[7-8], the teaching quality and mode of external treatment of Zhuang medicine^[9], *etc.* Both the two teams had the same number of published papers. The research team of external treatment of Zhuang medicine with Lin Chen as the core, taking the second place in terms of the number of paper published, mainly focuses on the therapeutic effects of medicinal thread moxibustion, meridian tendon therapy of Zhuang medicine and acupuncture therapy of Zhuang medicine on cervical spondylosis^[10-13], scapulohumeral periarthritis^[14-16], lumbar muscle strain^[17-19] and other diseases. The author's cooperation network diagram also shows that there was less cooperation among various research teams, which was related to the different research focuses and directions of different teams.



Fig. 2 Cooperation network of authors with papers published on external treatment of Zhuang medicine

Analysis of institutions' cooperation network

The 307 papers in this study involved 183 research institutions, including 6 institutions with 10 or more paper published (3.28%) and 6 institutions with 4-6 paper published (3.28%), as shown in Table 2.

Table 2 Institutions with 5 or more papers published on external treatment of Zhuang medicine

Institution	Number of papers published
Guangxi University of Chinese Medicine	112
The First Affiliated Hospital of Guangxi University of Chinese Medicine	37
Ruikang Hospital Affiliated to Guangxi University of Chinese Medicine	16
Guangxi International Zhuang Medicine Hospital	16
Guangzhou University of Chinese Medicine	11
College of Zhuang Medicine, Guangxi University of Traditional Chinese Medicine	10

The visualization analysis diagram shows that some research institutions cooperated with each other, as shown in Fig. 3. Guangxi University of Chinese Medicine published the most papers, 112 papers in total. Visualization analysis was conducted on the

cooperation network of institutions publishing papers on external treatment of Zhuang medicine, and 183 nodes and 136 connecting lines were obtained. A larger institutional node stood for a higher publication frequency. The connecting lines between every two nodes represented the cooperative relationship between the two institutions, and the closer the cooperative relationship, the thicker the connecting lines. The density of the diagram was 0.008 2, indicating that the density of the diagram was low, and the cooperation between institutions was scattered. There was no cooperation between institutions publishing papers in different regions in the figure.



Fig. 3 Cooperation network of institutions with papers published on external treatment of Zhuang medicine

Keyword co-occurrence analysis

The keyword co-occurrence analysis took network nodes as keywords and formed a keyword co-occurrence diagram composed of nodes and connecting lines after pruning. After further analysis of nodes, the research situation could be further explored.

In this study, 248 keywords were obtained, and the research frequency of the three external treatment methods introduced in this study is shown in Table 3.

Table 3 Keywords with frequency equal to or greater than 20 in the study of external Zhuang medicine

Keyword	Frequency
Medicated thread moxibustion	101
Meridian tendon therapy of Zhuang medicine	13
Acupuncture therapy of Zhuang medicine	10

A visual diagram of Chinese keyword co-occurrence analysis was constructed, and 248 nodes and 553 connecting lines were obtained, as shown in Fig. 4. Further analysis was conducted on the information behind the nodes while combining with the keywords, and it was found that the research on external treatment of Zhuang medicine involved comprehensive contents, including the efficacy, clinical efficacy and observation of various common diseases (periarthritis of shoulder, shingles^[20-22], migraine, *etc.*). Among the external treatment methods of Zhuang medicine, medicated thread moxibustion had the highest frequency and was the mainstream research direction, and important research included the treatment of shingles, migraine, and cervical spondylosis (key words: medicated thread moxibustion, shingles, migraine, and

content was the therapeutic effect of external treatment of Zhuang medicine on various common diseases and chronic diseases.

Experimental methods The keyword for 2020 was review, and that for 2021 – 2022 was clinical research. The therapeutic effects of external treatment of Zhuang medicine on diseases were determined through above methods.

Top 25 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2012–2022
Medicated thread	2012	1.70	2012	2014	████████████████████
Cervical spondylosis	2012	1.68	2012	2016	████████████████████
Medicated thread moxibustion	2012	2.04	2013	2014	████████████████████
Observation of therapeutic effects	2012	1.45	2013	2015	████████████████████
Dysmenorrhea	2012	1.33	2014	2014	████████████████████
Massage	2012	1.22	2014	2015	████████████████████
Lumbar muscle strain	2012	2.33	2015	2016	████████████████████
Eczema	2012	1.32	2015	2017	████████████████████
Treatment	2012	1.29	2015	2017	████████████████████
Progress	2012	1.19	2015	2015	████████████████████
Meridian tendon	2012	2.15	2016	2017	████████████████████
Zhuang Pharmacy	2012	1.29	2016	2017	████████████████████
Shingles	2012	1.46	2017	2017	████████████████████
Clinical efficacy	2012	1.89	2018	2019	████████████████████
Amblyopia	2012	1.51	2018	2019	████████████████████
Pricking blood	2012	1.23	2018	2020	████████████████████
Scapulothoracic periarthritis	2012	2.56	2020	2022	████████████████████
Arthralgia syndrome	2012	1.90	2020	2022	████████████████████
Review	2012	1.77	2020	2020	████████████████████
Zhuang medicine	2012	1.40	2020	2020	████████████████████
Clinical observation	2012	2.58	2021	2022	████████████████████
Research progress	2012	2.15	2021	2022	████████████████████
Stroke	2012	1.70	2021	2022	████████████████████
External treatment method	2012	1.70	2021	2022	████████████████████
Clinical research	2012	1.37	2021	2022	████████████████████

Fig. 6 Analysis on the emergence of keywords in papers on external treatment of Zhuang medicine

Discussion

Based on the CiteSpace software system, 307 papers retrieved from CNKI were displayed visually. Moreover, the information behind nodes of the visualization graphs was manually excavated and organized to visually display the trend of papers published in recent years, as well as the characteristics of cooperation among authors and institutions. The current main research contents, research hotspots and future research directions of medicated thread moxibustion, acupuncture therapy and meridian tendon therapy in external treatment of Zhuang medicine were pointed out.

The overall trend of papers published on external treatment of Zhuang medicine showed an increasing trend, indicating that the external treatment of Zhuang medicine is gradually receiving more and more attention, and people are starting to study this medical method that still has research space. Wei Yingcai and Pang Yuzhou were the authors with the largest number of papers, and Guangxi University of Chinese Medicine was the institution with the largest number of papers. The above phenomenon indicates that the research on external treatment of Zhuang medicine is mostly carried out in Guangxi, which is related to the influence of

Zhuang medicine in Guangxi. As a feature of ethnomedicine in Guangxi, Zhuang medicine is highly valued by medical professionals in Guangxi. Meanwhile, the cooperation network among literature authors and institutions showed that research teams had a certain degree of cooperation with each other, but still mostly conducted research independently, even if there was cooperation between research institutions. Researchers are often influenced by factors such as research content or research time to form different research teams.

Compared with traditional reviews, CiteSpace-based analysis can more conveniently, quickly, and intuitively present research contents and hotspots in the field, and the data analysis results can predict future research trends, thereby focusing and leading future research. However, there are also certain limitations. For example, in this study, we only extracted and analyzed CNKI literature, but there might be situations where the data analysis sources were not comprehensive enough. Such limitation will be gradually improved with the development of data, software updates, and improvement of measurement methods, and the research progress of the external treatment of Zhuang medicine methods can be more scientifically, accurately, and comprehensively revealed, which will provide scientific support for the research and development of this field.

Conclusions

Based on Bibliometrics methods, in this study, CiteSpace was employed to visually present and analyze authors, organizations and key words of the literature research on external treatment of Zhuang medicine and intuitively display the information about the key research directions, topics and research hotspots in the external treatment of Zhuang medicine from the establishment of the database up to now. Research suggests that the clinical application of the external treatment in Zhuang medicine is currently a research hotspot.

Among the external treatment methods of Zhuang medicine, medicated thread moxibustion, meridian tendon therapy and acupuncture of Zhuang medicine have high popularity and significant curative effect. They can be used clinically to treat stroke, periarthritis of shoulder, arthralgia syndrome, lumbar muscle strain, shingles, migraine and other diseases. As the research level of the external treatment of Zhuang medicine continues to deepen, its research on stroke will be the main potential direction for future development. With the help of information visualization, the research hotspots and general trends in the field of external treatment of Zhuang medicine were quickly identified, which will provide information for future research. This study will provide some reference value for the in-depth research and future topic selection of external treatment of Zhuang medicine.

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