Research on the Treatment of Chronic Pulmonary Heart Disease with Traditional Chinese Medicine in Recent 10 Years based on CiteSpace Visual Analysis

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Abstract: *Objective: To investigate the development regularity, research status and future research hotspots of chronic pulmonary heart disease treated with traditional Chinese medicine (TCM) in recent 10 years by visual analysis of CiteSpace software. Methods: The relevant literatures on the treatment of chronic pulmonary heart disease with traditional Chinese medicine published from 2014 to 2023 in the CNKI database were searched, and the number of documents issued, authors, institutions, and keywords of the included literatures were analyzed using CiteSpace software, and the knowledge map was drawn. Results: After screening, 683 articles were included and 262 authors were included, and Jun Liu and Zhengping Bai were the authors with the largest number of documents issued; A total of 244 research institutions were included, represented by Hunan University of Traditional Chinese Medicine; through co-occurrence analysis of keywords, the frequency of efficacy was the highest; keywords were clustered to form a total of 10 cluster labels; To highlight the keywords, cardiopulmonary function is always a research hotspot in this field, and quality of life, acupoint application, medication rules, and data mining may be future research hotspots in this field. Conclusion: At present, the research on the treatment of cor pulmonale with traditional Chinese medicine is in the bottleneck stage. It is recommended that researchers and institutions strengthen cooperation, carry out high-quality research, give play to the advantages of the motherland medicine, and promote the development of traditional Chinese medicine in this field.*

Keywords: Chronic pulmonary heart disease, Traditional Chinese medicine, Visual analysis, CiteSpace.

1. Introduction

Chronic pulmonary heart disease, referred to as pulmonary heart disease, is a type of heart disease caused by chronic lesions of the lung, thorax, or pulmonary arteries with increased pulmonary circulation resistance, formation of pulmonary hypertension, aggravated right heart load, and then causing changes in right ventricular structure and/or function, of which increased pulmonary vascular resistance and pulmonary hypertension are central links [1]. The disease is the terminal stage of a variety of pulmonary diseases and is mainly caused by chronic obstructive pulmonary disease, accounting for approximately 87% of the prevalence of pulmonary heart disease [2]. The prevalence of pulmonary heart disease in China is increasing year by year, with a prevalence of 4.8% in people over 14 years of age, which seriously endangers the health and life of patients and brings a huge economic burden to families and society [3]. At the beginning of the disease, the symptoms of primary respiratory system diseases are predominant, and at the later stage of the disease, in addition to the manifestations of acute exacerbation of the primary disease, pulmonary and cardiac function and other organ function damage gradually appear [4]. In view of acute exacerbation of cor pulmonale, western medicine mainly takes anti-infection, correction of respiratory failure, control of heart failure, prevention and treatment of complications as the main principles, which can relieve symptoms in a short period of time, but the patient's condition is easy to repeat, and drug resistance and drug side effects may also occur. Traditional Chinese medicine (TCM) has the advantages of overall regulation and syndrome differentiation, and has considerable effect in improving the clinical symptoms, cardiopulmonary function, and quality of life of patients with corpulmonale [5-7].

CiteSpace is a Java language based scientific knowledge mapping tool, developed by Chen Chaomei 's team, based on co-reference analysis theory and path finding network algorithm, to help researchers better understand the development history and current situation of the research field, as well as provide a certain theoretical basis for predicting future research hotspots in the research field [8]. In this study, CiteSpace was used to analyze the current status and hot trends of TCM treatment of pulmonary heart disease in order to provide new reference ideas for researchers to carry out further research in the future.

2. Materials and Methods

2.1 Data Sources and Search Strategies

Literature data was derived from China National Knowledge Infrastructure (CNKI) to find the relevant literatures on the treatment of chronic pulmonary heart disease with traditional Chinese medicine, and "chronic pulmonary heart disease" was used as the subject term for search, with the search formula: theme = chronic pulmonary heart disease + pulmonary heart disease + CPHD. The subject gate selected "traditional Chinese medicine", "traditional Chinese medicine" and "integrated traditional Chinese and western medicine", limited the search language to Chinese, and limited the time range to January 1, 2014 to December 31, 2023, and 842 relevant articles were retrieved, excluding articles with unknown information such as repetition, author, year, and institution, and finally 683 articles were included.

2.2 Inclusion Criteria and Exclusion Criteria

Inclusion criteria: According to the theme of "Chinese

medicine treatment of chronic pulmonary heart disease" and published journal literature, the data are complete, true and reliable, ethnic minority medicine are included.

Exclusion criteria: (1) Literature not conforming to the subject; (2) Repeated published literature; (3) Literature with incomplete bibliography information such as author, year, and institution; (4) Review, conference, and doctoral dissertation.

2.3 Data Processing

The retrieved literatures were exported in Note Express format, screened in Note Express, and exported in RefWorks-CiteSpace format after screening, named download.txt format. CiteSpace6.2.R6 software was used for data conversion, and the authors, institutions, and keywords of the included literatures were analyzed. Node type selected author, institution, keywords as the object of analysis, in the time partition selected start and end time from January 1, 2024 to December 31, 2023, time slice for 1 year, node threshold set at 50.

3. Results

Analysis of number of documents issued: Statistical analysis was performed on the number of publications of the literature on the treatment of pulmonary heart disease with traditional Chinese medicine from 2014 to 2023, as shown in Figure 1, with the largest number of documents issued in 2014, reaching 136, and 32 documents issued in 2023, which was the lowest value of the number of documents issued in the past 10 years. During this period, although the number of documents issued fluctuated up and down, the overall trend showed a downward trend, and the number of documents issued in this field is at a relatively low level at this stage.
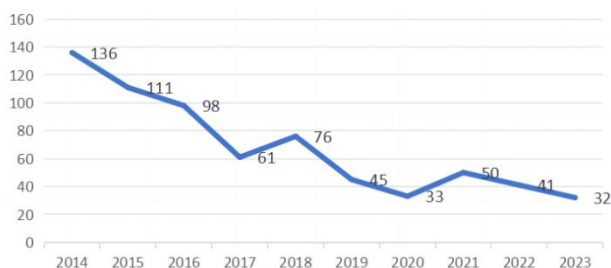

Figure 1: Annual Issuance Volume

Author analysis: Performing statistical analysis and co-occurrence mapping for authors and collaborating networks. According to Table 1, among the top four authors in terms of the number of documents issued, Jun Liu issued the most documents, with a number of documents issued of 6, followed by Zhengping Bai (4), Yun Lu (3) and Li Zhang(3).

Table 1: Number of Documents Issued by Authors

Serial Number	Author	Quantity Issued (Section)
1	Jun Liu	6
2	ZhengPing Bai	4
3	Yun Lu	3
4	Li Zhang	3

The authors' co-occurrence map is shown in Figure 2, with a co-occurrence map density of 0.0033, and a total of 262 nodes and 113 lines were obtained. Among them, the number of nodes represents the number of authors issued, the connection between nodes represents that there is a cooperative

relationship between authors, and the co-occurrence map density represents the closeness of cooperation. The results of the study showed that two large cooperative groups have been formed in this field, and teams centered on the authors of Liu Jun and Bai Zhengping are closely linked. The network density of the map is 0.0033, indicating that the cooperation relationship between authors is weak, there is little cooperation between various teams, and the cooperation between authors and teams urgently needs to be strengthened.
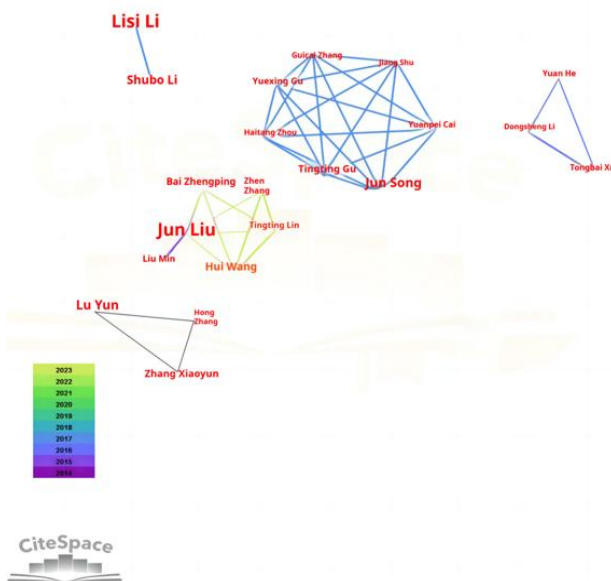

Figure 2: Author Collaboration Network

3.1 Institutional Cooperation Network Analysis

The institutions of the authors of the included articles were analyzed, and among the top five institutions, the institutions with the most documents issued were Hunan University of Traditional Chinese Medicine (8), followed by Inner Mongolia Autonomous Region University of Traditional Chinese Medicine (6), Affiliated Hospital of Hunan Academy of Traditional Chinese Medicine (5), Nanjing University of Traditional Chinese Medicine (4), and Yunnan Provincial Hospital of Traditional Chinese Medicine (4).

Table 2: Quantity of Documents Issued by Institutions

Rank	Quantity Issued (Section)	Institution
1	8	Hunan University of Traditional Chinese Medicine
2	6	Inner Mongolia Hospital of Traditional Chinese Medicine
3	5	Affiliated Hospital of Hunan Academy of Traditional Chinese Medicine
4	4	Nanjing University of Chinese Medicine
5	4	Yunnan Provincial Hospital of TCM

The co-occurrence map of the research institution is shown in Figure 3, and a total of 244 nodes and 74 connections are obtained, with a network density of 0.0025. The number of nodes represents the number of issuing institutions, the connection between nodes represents the existence of cooperative relationship between institutions, and the

closeness of cooperation between institutions with a total map density. The research results show that there are many research institutions in this field, but the research force is scattered, and some institutions have some cooperation, but the cooperation relationship is not close.

Figure 3: Facility Co-occurrence Diagram

3.2 Keyword Analysis

Keyword is the core generalization of a paper, and analysis of keywords can peep into the theme of the article, and high-frequency keywords represent a research hotspot in this field to a certain extent [9].

3.2.1 Keyword Co-occurrence Analysis

Before performing keyword contribution analysis, keywords with similar meanings were first combined, such as heart failure, right heart failure, and right heart failure uniformly combined into heart failure, and clinical efficacy, clinical effect, efficacy observation, treatment effect, treatment result, and effect uniformly combined into efficacy. Key co-occurrence profiles are shown in Figure 6.A total of 294 keyword nodes and 630 connections were obtained, with a network density of 0.0146.The node size of keywords reflects the word frequency, and the line thickness between keywords reflects the closeness of the connection between keywords. Key words for the top 10 co-occurrence frequencies are shown in Figure 4, among them, there are four keywords with centrality > 0.1, which are pulmonary heart disease (0.8), efficacy (0.17), cardiopulmonary function (0.17), and heart failure (0.16) from largest to smallest, and the higher the centrality, the greater the influence of keywords.
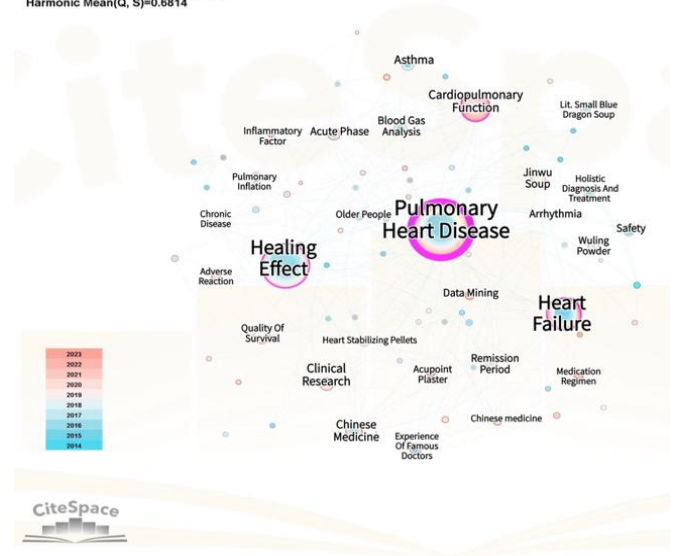
Figure 4: Key Words Co-occurrence Diagram

Table 3: Key word frequency table

Frequency	Centrality	Year	Key Words
201	0.8	2014	Cor pulmonale
141	0.17	2014	Efficacy
78	0.16	2014	Cardiac failure
69	0.17	2014	Cardiopulmonary function
25	0.06	2014	TCM
24	0.03	2014	Clinical study
20	0.02	2014	Zhenwu Decoction
20	0.06	2015	Quality of life
19	0.01	2014	Acute phase
17	0.05	2014	Remission phase

3.2.3 Keyword Cluster Analysis

Keyword clustering is a reflection of the research hotspot, which can provide reference value for the development law of this field to a certain extent.Log-likelihood function rate (LLR) was used to cluster keywords, and the clustering profile is shown in Figure 3, including 294 nodes and 630 lines, with a Q value of 0.5661 (> 0.3 cluster structure is reasonable) and an S value of 0.8555 (> 0.7 cluster effect is convincing), suggesting that keyword clustering in this study is significant and convincing. A total of 10 cluster labels were obtained in this study, and cluster information is shown in Table 9,Among them, #0, #2, #3 and #5 mainly study cardiopulmonary function, #1 mainly study the clinical efficacy of traditional Chinese medicine in the treatment of pulmonary heart disease, #4 study the experience of various famous doctors in the treatment of pulmonary heart disease summary, #6 study the quality of life of patients receiving traditional Chinese medicine treatment in the later stage, #7 is about the disease name and etiology and pathogenesis of pulmonary heart disease in traditional Chinese medicine, #8 mainly through data mining to study the treatment of pulmonary heart disease by traditional Chinese medicine, #9 is based on the theory of traditional Chinese medicine shape and qi convergence to study pulmonary heart disease.
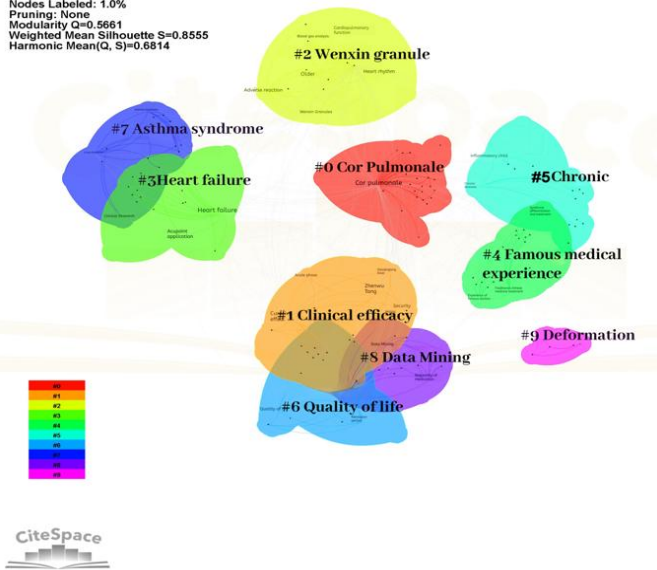
Figure 8: Keyword Cluster Diagram

Table 9: Key word clustering information

Cluster ID	Size	Profile Value	Year	Cluster Key
# 0	44	0.94	2016	Pulmonary heart disease, Chronic pulmonary heart disease, Pulmonary function, Cardiac function, Lower limb edema
# 1	34	0.677	2016	Clinical efficacy, Zhenwu decoction, Clinical efficacy, Safety, Acute attack
# 2	28	0.833	2016	Wenxin Granule, Pulmonary function, Adverse reaction, Arrhythmia, Blood gas
# 3	24	0.813	2018	Heart failure, Heart failure, Zhisou powder, Right heart failure, Liujunzi decoction
# 4	23	0.895	2017	Famous Doctor Experience, Wu Weiping, Traditional Chinese Medicine, Traditional Chinese Medicine Treatment, Sangsu Guiling Yin
# 5	21	0.756	2017	Chronic, Respiratory failure, Pulmonary, Cardiac disease, Inflammatory factors
# 6	19	0.884	2016	Quality of life, Remission period, Emotional care, Cardiopulmonary Qi deficiency syndrome, Recurrence rate
# 7	18	0.926	2015	Asthma syndrome, Lung distention, Palpitation, Clinical observation, Warming yang and benefiting water
# 8	17	0.888	2019	Data mining, Medication rules, National patents, TCM
# 9	5	1	2023	Deformation, shape deficiency, coalescence theory, gas coalescence, gas dispersion

3.2.4 Key Word Emergent Analysis

Burst and transfer of research hotspots can be observed from emergent words [9]. A total of 14 emergent words were obtained by emergent analysis of keywords, as shown in Figure 10, among them, the largest emergent intensity and the longest emergent time are "cardiopulmonary function", the intensity is 7.76, and the emergent time is 10 years, which has been a research hotspot.

Top 14 Keywords with the Strongest Citation Bursts

Figure 10: Key word emergent diagram

4. Discuss

In recent years, the number of documents issued by traditional Chinese medicine in the treatment of pulmonary heart disease has been decreasing year by year, and the study has entered the bottleneck period, which is mainly reflected in the limited research methods, and the research scope is mostly focused on the observation of the clinical efficacy of traditional Chinese medicine in the treatment of pulmonary heart disease.

By analyzing the author 's cooperation network diagram, it can be seen that there are few cooperation among authors in this field, and the cooperation team with more documents is the team with Liu Jun and Bai Zhengping as the core members. Jun Liu discussed the treatment of cor pulmonale based on the theory of shape and qi convergence in TCM. By analyzing the convergence movement of shape and qi in cor pulmonale, he believed that the dispersion change of shape and qi ran through the whole course of the disease, and the staging should be distinguished first in the treatment of cor pulmonale. For the acute phase, the potential accumulation effect was the main contradiction, and the treatment focused on "convergence and dispersion", with regulating qi, treating water, and removing blood stasis as the treatment means. For the remission period, the potential dispersion effect is the main contradiction, the treatment focuses on "the dispersion of the convergence", when the warming yang fills the essence to supplement the shape, the elimination of the disease Sanjie deformation, for a long time for the work, materialization shape complex [10]. Zhengping Bai and Jun Liu have a close cooperation relationship. Through clinical observation trials, the two found that Xinmailong combined with enoxaparin combined with conventional western medicine in the treatment of patients with pulmonary heart disease and heart failure, the clinical effect is significantly better than western medicine alone [11]. For patients with cor pulmonale in remission, adding traditional Chinese medicine treatment on the basis of conventional treatment has a better effect on improving the quality of life of patients [12]. Based on data mining, the analysis of the medication regularity of national patented Chinese herbal compound in the treatment of pulmonary heart disease revealed that the treatment of the disease is often based on supplementing qi, activating blood circulation, and resolving phlegm, and the drugs with strong association are ginseng, schisandra chinensis, Ophiopogon japonicus, Poria cocos, and Salvia miltiorrhiza [13].

Analyzing the institutions of the authors of the included literatures, among the institutions in the top 5 of the number of documents issued, the institution with the first number of documents issued is Hunan University of Traditional Chinese

Medicine, and the research results reflect that there are many research institutions in this field, but the research force is more dispersed, and some institutions have certain cooperation, but the cooperation relationship is not very close. There is a lack of deep cooperation and information exchange in this field. How to break regional and disciplinary restrictions, make the cooperation between researchers and institutions closer, and build a good academic exchange platform may be one of the key methods to break the current research bottleneck.

Through the analysis of keywords, cardiopulmonary function has always been a research hotspot in this field, and the research type is mainly clinical research, focusing on the clinical efficacy of traditional Chinese medicine in the treatment of the disease, the improvement of cardiopulmonary function and the improvement of the quality of life of patients. The main research methods are integrated traditional Chinese and western medicine, and the treatment methods are based on activating blood circulation and benefiting water, clearing away heat and phlegm, invigorating spleen and supplementing qi, and warming yang and benefiting water [14-16]; Oral administration of traditional Chinese medicine is based on Wuling San, Zhenwu Decoction, and Mufangji Decoction [17-19]; Chinese patent medicines are mainly injected with Xinmailong injection, ligustrazine injection and Tanreqing injection [20,21]; External treatment of TCM mainly includes acupoint application therapy, foot bath of traditional Chinese medicine, acupuncture, and auricular point pressing pills [22,23]. At present, there are few studies on the mechanism of action in this field and animal experiments are lacking, and research can be strengthened in this area in the future. Key word emergent analysis suggests that medication regularity, data mining, and acupoint application are future research hotspots.

5. Nodule

In this study, only the relevant journal literatures of CNKI were searched. The search time range was nearly 10 years. The language was limited to Chinese, the range was limited, the number of literatures was small, and the quality of literatures was uneven. There would be some deviations in the study results and it could not completely represent the study of traditional Chinese medicine in the treatment of pulmonary heart disease. However, overall, the research heat on the treatment of pulmonary heart disease with traditional Chinese medicine has gradually decreased, how to break the current research bottleneck, explore new research directions, deepen the depth of research, strengthen the cooperation of researchers and research institutions, and how to make traditional Chinese medicine play a full advantage in the treatment of pulmonary heart disease in the future is an urgent problem to be solved.

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