Analysis of the Current Situation and Trends of Medical Translation Research in China

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Abstracts: Medical translation is an interdisciplinary research direction between medicine and translation, with both theoretical and practical value. This study is based on the CNKI core paper database, utilizing the CiteSpace knowledge graph visualization tool and Excel data analysis. A systematic literature review method is used to sort out 1764 articles in Chinese medical translation related journals from 2001 to 2022, in order to clarify the research content and characteristics of medical translation. A dynamic econometric analysis was conducted on the current status and trends of medical translation research in the past two decades, and the results showed that: 1) Chinese medical translation research has shown an overall upward trend in the past two decades. 2) The research direction of influential authors in Chinese medical translation research is mostly traditional Chinese medicine translation, with research institutions mainly being universities of traditional Chinese medicine, and research achievements in Western medicine translation account for a relatively small proportion. 3) The main focus of Chinese medical translation research is the English translation of traditional Chinese medicine (TCM) terms. From the perspective of highlighted words, corpus and medical translation talent cultivation have been cutting-edge topics in recent years, and it is predicted that they will continue to grow in popularity in the future.

Keywords: Medical Translation, Medical English, Cite Space, Information Visualization.

1. INTRODUCTION

Medical translation is an interdisciplinary research direction between medicine and translation, with both theoretical and practical value. As a composite discipline of medicine and translation, the distribution of medical translation disciplines includes fields such as linguistics, basic medicine, clinical medicine, education, traditional Chinese medicine and the integration of traditional Chinese and Western medicine. It requires the collaborative participation of talents from multiple fields to promote the development of medical translation. CiteSpace is an information visualization software developed by Professor Chen Chaomei in Java language based on citation analysis theory. Through a diverse, time-sharing, and dynamic citation analysis visualization language, CiteSpace can learn about the most interesting topics and scientific literature in massive literature data, finding the most important and critical effective information, clarifying the past and present development processes and identifying the most active research frontiers and development trends. The visualization graphics obtained through visualization analysis are called "Mapping knowledge domains" (MKD).

2. RESEARCH DESIGN

2.1. Research Questions

This study aims to explore three questions:

1) What are the characteristics of the publication volume, authors, and publishing institutions of domestic research papers on medical translation?

2) What are the trends in keyword co-occurrence, clustering, and mutation in domestic research papers on medical translation?

3) What are the current problems and future research directions in domestic research on medical translation?

2.2. Research Tool

The study employs visual analysis software CiteSpace 5.7.R4, running in a Java environment. This software can perform dynamic scientific knowledge graph analysis on a certain topic, presenting the research trends and cutting-edge trends of the topic based on publication volume, highly cited journals, literature, authors, keyword co-occurrence, clustering, and mutation.

3. RESULTS

3.1. Annual Distribution of Publication Volume

The study provides statistics on the annual publication volume of medical translation research in China from 2001 to 2022. The publication volume of medical translation research in China has shown an overall upward trend in the past two decades. Among them, from 2001 to 2003, the publication volume was relatively stable, with an average of 34 articles per year. Since 2004, there has been an upward trend, although there was a decline in 2007 and 2011, the overall trend is upward. In 2014, it achieved a breakthrough in the hundreds, with an annual publication volume of 123 articles, an increase of 37 articles compared to the previous year. Although there was another decline in 2018, with an annual publication volume of 101 articles, it reached its peak in nearly two decades in 2019, with an annual publication volume of 129 articles, and the average from 2020 to 2022 are 140 articles.

3.2 Author Collaboration Co-occurrence Graph

According to Excel data statistics, there are 19 authors in China who have published more than 10 articles or more in medical translation research in the past two decades, as shown in Table 1 (Figure 1):

Table 1: Number of high-yield author publications in medical translation research in China from 2001 to 2022

Serial number	Author (unit)	Number of publications	Serial number	Author (unit)	Number of publications
1	Li Yongan (Shaanxi University of Traditional Chinese Medicine)	19	11	Zhao Xia (Beijing University of Traditional Chinese Medicine)	12
2	Yao Xin (Nanjing University of Traditional Chinese Medicine)	19	12	Yu Jing (Jiangxi University of Traditional Chinese Medicine)	12
3	Wang Lu (China Medical University)	17	13	Mao Horong (Hubei University of Traditional Chinese Medicine)	11
4	Niu Chuanyue (Shanghai University of Traditional Chinese Medicine)	17	14	Du Lilan (Beijing University of Traditional Chinese Medicine)	11
5	Wu Qing (Beijing University of Traditional Chinese Medicine)	16	15	Wang Xiaofang (Jiangxi University of Traditional Chinese Medicine)	10
6	Zhang Bin (Nanjing University of Traditional Chinese Medicine)	16	16	Zhao Yi (China Medical University)	10
7	Ding Nianqing (Shanghai University of Traditional Chinese Medicine)	14	17	Liu Aijuan (Beijing University of Traditional Chinese Medicine)	10
8	Zhang Qingrong (Liaoning University of Traditional Chinese Medicine)	13	18	Liu Cheng (Jiangxi University of Traditional Chinese Medicine)	10

9	Shi Yunzhong (Nanjing University of Traditional Chinese Medicine)	13	19	Chen Ning (Beijing University of Traditional Chinese Medicine)	10
10	Du Xueqin (Jiangxi University of Traditional Chinese Medicine)	12	…	……	…

According to Table 1, in the past two decades, Li Yong'an from Shaanxi University of Traditional Chinese Medicine and Yao Xin from Nanjing University of Traditional Chinese Medicine have both published 19 medical translation related articles, ranking first in terms of publication volume. Wang Lu from China Medical University and Niu Chuanyue from Shanghai University of Traditional Chinese Medicine both published 17 medical translation related articles, ranking third in terms of publication volume. Wu Qing from Beijing University of Traditional Chinese Medicine and Zhang Bin from Nanjing University of Traditional Chinese Medicine have both published 16 articles related to medical translation, ranking fifth in terms of publication volume.

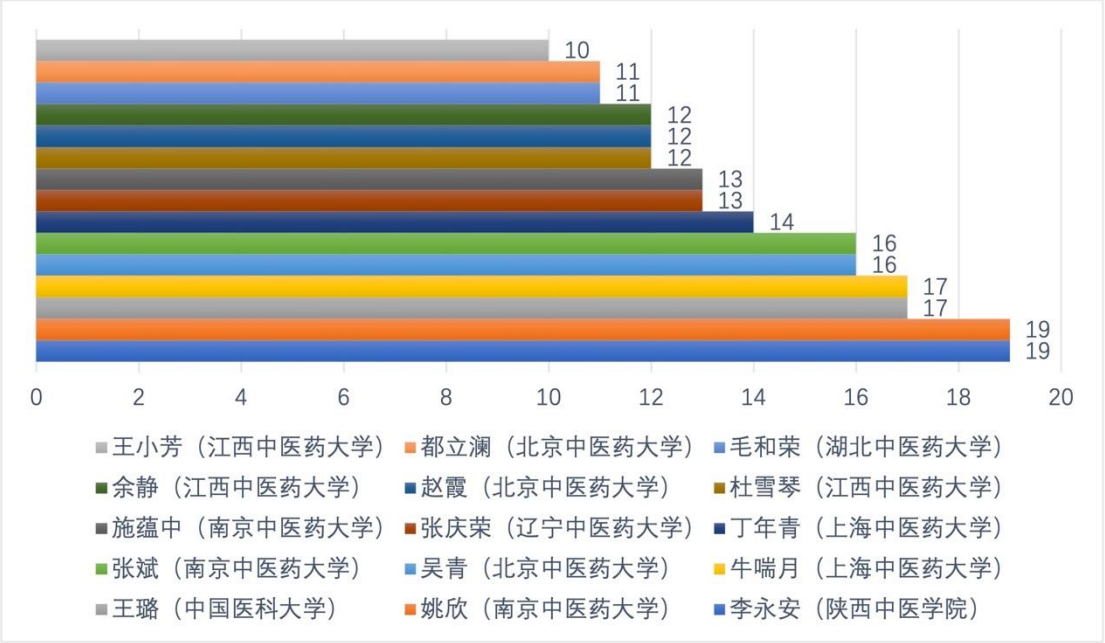

Figure 1 High yield authors of medical translation research in China from 2001 to 2022

The formation of an author collaboration co-occurrence graph through CiteSpace is beneficial for understanding the collaborative relationships and core research groups among author groups within a certain disciplinary field. In the author collaboration graph, a node represents one author. The larger node represents the greater the influence of authors. The width of the node circle indicates the frequency of occurrences in different years. The larger the circle means the higher the number of articles published by the author in the corresponding color year. The connection between nodes represents the cooperative relationship between authors. The thicker the connection between nodes, the higher the co-occurrence frequency and closer the cooperation between authors.The study uses CiteSpace software to extract author information from research literature, seting the time slicing to From 2001 JAN to 2022 DEC, the # Years Per Slice to 2, and selecting Author for Node Types. In the Selection Criteria setting interface, set the node threshold in the Top N column to Top 10 per slice, that is, extract the top 10 authors in each time slice, and generate an author collaboration co-occurrence graph, as shown in Figure 2.

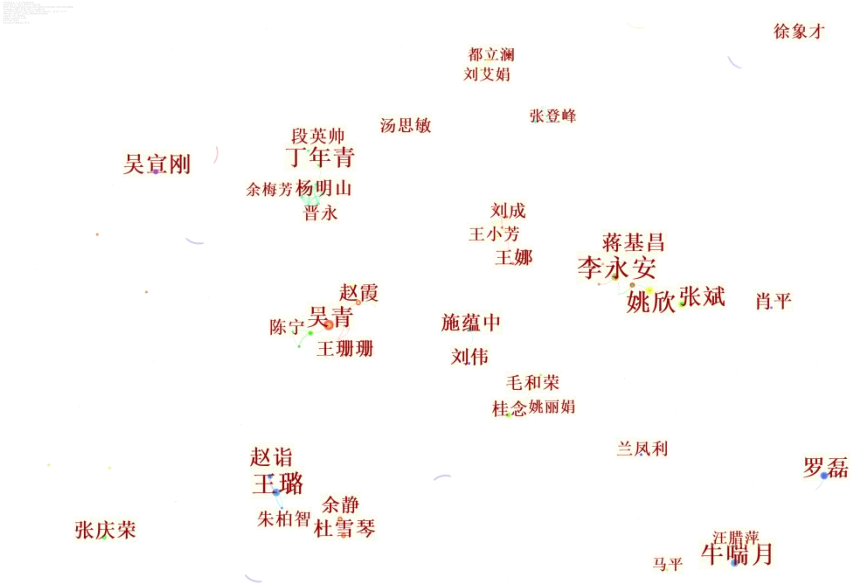

Figure 2 Collaborating Graph of Authors in Medical Translation Research in China from 2001 to 2022

The results show that there are 1594 qualified records, and the graph network contains 862 nodes (N=862). Therefore, 862 institutions were extracted, with 270 connections between nodes (E=270), meaning that there are 270 connections between 862 institutions, with a density of 0.0007 (Density=0.0007). Q=0.3568, S=0.9922. It is generally believed that clustering is reasonable when the modular Q value is greater than 0.3 and the average contour value S is greater than 0.5. Therefore, the collaborative co-occurrence graph clustering distribution of this research institution is reasonable.

From the Figure, it can be seen that the node font and annual ring thickness of the School of Foreign Languages at Nanjing University of Traditional Chinese Medicine, the School of Humanities at Beijing University of Traditional Chinese Medicine, and the Foreign Language Teaching Center at Shanghai University of Traditional Chinese Medicine are the largest, indicating that the three research institutions above have the greatest research influence in the field of medical translation. Overall, the main institutions for medical translation research in China are universities of traditional Chinese medicine, with research fields focusing on traditional Chinese medicine translation, and research communities mainly emerging among universities of traditional Chinese medicine. However, other medical schools that are not reflected in the figure indicate that research institutions in non traditional Chinese medicine universities have weak research capabilities in medical translation and moderate research enthusiasm.

3.4. Keyword Co-Occurrence, Clustering, and Mutation Analysis

Through CiteSpace, a keyword co-occurrence graph is formed based on keywords extracted from literature data such as paper titles and abstracts, which can intuitively reflect the research hotspots and trends in the field of medical translation. At the same time, clustering based on keywords can explore various hot sub fields in the field. Extract keyword information from research literature using CiteSpace software to generate keyword co-occurrence and clustering graphs, as shown in Figure 3.

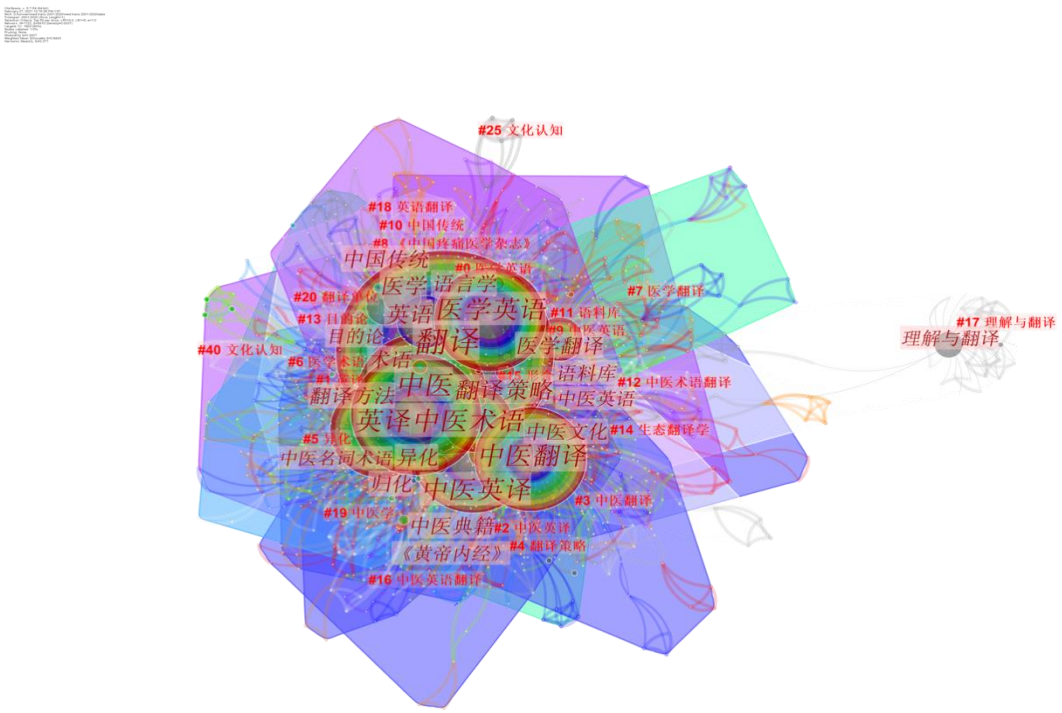

Figure3. Keyword co-occurrence and clustering graph

The results show that there were 1594 qualified records, and the graph network contain 1722 nodes (N=1722). Therefore, 1722 keywords were extracted, and 5410 connections were found between nodes (E=5410), indicating that there were 5410 connections between 172 institutions, with a density of 0.0037 (Density=0.0037).The main hot keywords in the Figure are ranked in order of occurrence frequency (count): translation (377), traditional Chinese medicine (159), English translation (150), traditional Chinese medicine terminology (149), traditional Chinese medicine translation (139), traditional Chinese medicine English translation (136), medical English (132), translation strategy (78), English (61), medicine (54), medical translation (46), terminology (46), Chinese tradition (45), domestication (40), foreignization (40) Traditional Chinese Medicine Classics (39), Linguistics (37), Translation Methods (37), Traditional Chinese Medicine Culture (35), Corpus (30), Traditional Chinese Medicine English (29), Understanding and Translation (29), Huangdi Neijing (28), etc. From the perspective of historical evolution, the relatively stable research hotspots in medical translation in China in the past two decades have focused on traditional Chinese medicine, English translation, traditional Chinese medicine terminology, medical English, translation strategies, traditional Chinese medicine classics, etc. In terms of traditional Chinese medicine translation, prominent research directions include the English translation of traditional Chinese medicine terminology, corpora, and the translation of traditional Chinese medicine classics represented by the Huangdi Neijing. Niu Chuanyue (2007) believes that understanding is the foundation of traditional Chinese medicine translation, and therefore "understanding and translation" is also a theme keyword in domestic medical translation research.

In CiteSpace, prominent words in the field can be generated through the prominent word algorithm, which detects the cutting-edge topics of research topics in the field.The English translation of prominent words, traditional Chinese medicine translation, traditional Chinese medicine culture, traditional Chinese medicine terminology, traditional Chinese medicine, corpus, medical translation, translation strategies, and traditional Chinese medicine classics have been the forefront topics in medical translation research in China in recent years.

Corpus is a hot research topic from 2014 to 2022, and the study predicts that researches on medical translation corpora will continue to be popular. In terms of medical translation, corpus research has the following value:

Firstly, the corpus is an intuitive tool for comparative analysis of literature and language such as establishing a corpus for researching English vocabulary in medical research papers. Zhang Ruijun (2010) established a database of the English titles of 2000 domestic scientific papers from famous foreign medical journals, analyzed the characteristics of medical papers, and concluded that commonly used vocabulary accounts for a large proportion, while nouns, compound words, and certain prepositions appear more frequently. Analyzing the wording of published medical papers is beneficial for contributors to improve their submission success rate. Corpus can also be used to compare and study the translation characteristics of traditional Chinese medicine English translations, the most typical of which is the comparison of the English translations of the Yellow Emperor's Internal Classic, which is beneficial for avoiding misunderstandings in the reprint of traditional Chinese medicine English translations and creating more high-quality and accurate translations (Ye Xiao and Dong Minhua, 2015). Some scholars have also conducted researches on the manifestation phenomenon in the translation of pathogenesis terms, and found that the frequency of manifestation is the highest using word addition as a means. The essential difference between the philosophical systems of TCM and Western medicine is the reason for the different frequency of manifestation use between Chinese and foreign translators (Du Lilan et al., 2014).

Secondly, corpora are high-quality and efficient teaching aids. For example, a large number of available language materials and translation examples in traditional Chinese medicine corpora are conducive to unleashing students' learning initiative and enthusiasm, improving translation skills, enhancing the pertinence and effectiveness of translation teaching, enhancing the learning effect of translation strategies, and ensuring translation quality (Zhou Zhigang et al., 2014). Xiang Bing (2017) believes that introducing corpora as a teaching tool in medical English teaching, with real corpora set as the selection range, enables students to better distinguish synonyms and choose terms more accurately.

Thirdly, corpora are an effective means to improve translation efficiency and ensure translation quality. Tang Guoshun (2014) established a corpus of medical English materials published in China in both Chinese and English using the Access database format of the Office suite as an independent sentence segmentation. After four steps of word extraction, table building, translation, and modification and finalization, it was concluded that introducing the corpus into the translation process greatly improves translation efficiency. Its characteristics are fast operation speed, high quality and credibility, and easy promotion. Some scholars also believe that monolingual corpora have a function that cannot be replaced by bilingual corpora, that is, to overcome the problem of "translational tone" and present the most authentic and professional expression methods (Zhang Zhiquan and Wang Lianzhu, 2016).

In the topic of medical translation, the cultivation of medical translation talents is also a hot subtopic. Wang Yan (2007) points out that there are three major requirements for cultivating medical translation talents, namely, qualified medical translators should pay attention to the standardized and authentic language expression and style of translation. The should be able to identify errors or non-standard expressions in the original text, communicate with the original author when necessary to improve the quality of the translation, and clarify the language style and writing form of the target language article to help improve the chances of translation publication. Zhang Huijuan (2014), points out that the cultivation of medical translation ability should be guided by localized services, closely combined with modern information network technology, and adopt a talent training model combining industry, education and research. The universities should actively cooperate with pharmaceutical enterprises, which helps students access to real market materials and improve translation practice. Huang Yuxiu (2015) proposes the "Translation Project Management Teaching Model" based on the medical translation talent cultivation model, which involves students introducing them into real medical translation projects and improving their translation skills through teamwork and practical projects, in order to better meet the practical needs of the market. Li Chenyang (2018) proposes the idea of "translation workshops" to assist medical talent teaching, which is beneficial for enhancing students' translation professionalism and more in line with the market's requirements for translators. Guo Zikai and Chen Chen (2019) propose the necessity of forming a medical translation team consisting of translators, medical consultants, and corpus production personnel. In their researches, they focus on analyzing the feasibility of forming a medical translation team with professional personnel from a corpus perspective, which goes further than just discussing a translation team composed of students majoring in translation, providing a more professional guarantee for translation quality. Huang Chunxia (2020) believes that the cultivation of high-quality medical

translation talents should also include government support, and the government should introduce policies to ensure an environment for joint training of medical translation talents between schools and enterprises.

DISCUSSION AND CONCLUSION

From the research data on medical translation in China over the past two decades, the following analysis can be drawn:

The research on medical translation in China mainly focuses on the English translation of traditional Chinese medicine, with less attention paid to the English translation of Western medicine and the translation of traditional Chinese medicine into other languages, resulting in a relatively low research enthusiasm. The excessive emphasis on traditional Chinese medicine translation may have a "missing corner" impact on the application practice of domestic medical translation, because currently, cooperation between domestic and foreign pharmaceutical enterprises mainly based on Western medicine still occupies a large part of the market translation volume.

The main research institutions for medical translation in China are universities of traditional Chinese medicine, with research fields focused on traditional Chinese medicine translation. Research communities mainly arise between universities of traditional Chinese medicine, while research institutions in non traditional Chinese medicine universities have relatively weak research capabilities in medical translation, and research results are still in the process of continuous preparation.

The research on medical translation corpora will continue to be hot, and future research in the field of corpora may involve the promoting role of corpora in scientific research, teaching, translation practice, and other aspects. At present, scholars have a high enthusiasm for the establishment of English translation corpus, and future research may move towards the establishment of translation corpora based on other languages. In terms of teaching, corpora may be used to promote the concept of traditional Chinese medicine to foreigners.

The cultivation of medical translation talents is still a focus of discussion in the academic community. With the advancement of global cooperation in the field of medicine, high-quality medical translators that meet market demand have broad career prospects, but the qualification requirements are particularly demanding. Therefore, how to cultivate translators who meet the needs of the current pharmaceutical translation market is a research priority that various training units should continuously practice and optimize their training plans. The future research direction will be to cultivate medical translation talents in appropriate modes and means. Requiring medical translation talents to master the skills required by the localization industry is also a necessary condition. Future medical translation talent cultivation or further introduction of medical translation talent cultivation paths should meet the employment needs of localized enterprises.

This study is based on the CNKI paper database and uses CiteSpace 5.7.R4 bibliometric visualization software to conduct a scientific knowledge graph analysis of the publication volume, authors, research institutions, keyword co-occurrence, clustering, and mutation data of medical translation research in China in the past two decades. The results show that: 1) The overall trend of medical translation research in China has been on the rise in the past two decades, with a large number of high-yield scholars emerging, such as Li Yong'an, Yao Xin, Wang Lu Niu Chuanyue and others. 2) Most of the influential authors in domestic medical translation research focus on the translation of traditional Chinese medicine into English, with research institutions mainly being universities of traditional Chinese medicine, and research achievements in Western medicine translation account for a relatively small proportion. 3) The main focus of domestic medical translation research is the English translation of traditional Chinese medicine (TCM) terms. From the perspective of highlighted words, corpus and medical translation talent cultivation have been cutting-edge topics in recent years, and it is predicted that they will continue to grow in popularity in the future.

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