Evaluating the humanistic literacy of Chinese medical students

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Research Article

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Abstract

Background

Medical education needs to strengthen its focus on improving the humanistic quality of medical students while improving their medical knowledge and skills. This study aims to identify and integrate the current literature and research hotspots on raising medical students’ humanistic literacy to provide a reference for researchers.

Methods

CiteSpace is a Java application which supports visual exploration with knowledge discovery in bibliographic databases. We searched the China Knowledge Network (CNKI) database for articles published between 1995 and 2022. "Humanistic quality of medical students" was the key search term. Titles and abstracts were screened and extracted according to the inclusion and exclusion criteria. The CiteSpace software was used to retrieve 941 humanistic quality journal articles geared toward medical students from the CNKI database up to April 2022. A comprehensive review was conducted on these articles to reveal the current situation and hotspots of research aimed at improving medical students’ humanistic quality.

Results

The study found that the number of publications on humanities literacy research for medical students has increased overall over the past 20 years, although a certain graph shows an inverted S-shaped fluctuation. Research on improving the humanistic quality of Chinese medical students is predominantly conducted by medical colleges. No single author or institutional core group dominates the field of research on medical students’ humanistic qualities. The main study focuses on humanistic qualities, medical students, higher vocational students, and higher vocational colleges.

Conclusion

Based on the research trends of medical students’ humanistic literacy, combined with CiteSpace's visual knowledge maps, this study provides an in-depth understanding of the main authors, institutions, and research hotspots in humanistic literacy for medical students. The information in this study is most valuable to researchers interested in medical student education. This study summarizes the current development and ideological foundations of humanistic literacy among medical students in China. This study helps researchers to grasp the scientific development and research issues in the field of humanistic literacy of medical students in China.
Introduction

The Communist Party of China has always attached great importance to public health. According to the report of the 19th National Congress of the Communist Party of China, the principal social contradiction in the new era of socialism is "the contradiction between the people's growing demand for a better life and the imbalance and inadequacy of development." In medical and health care, people's demands and expectations concerning their health are growing by the day. People no longer pay attention to only the disease. Instead, they examine the overall physical, psychological, and social conditions that arrive with one. With the continuous improvement of medical and health service requirements, patients hope to receive an all-around, holistic healthcare approach, thus highlighting the importance of the human aspects of medical care. However, the traditional medical education model in China, which focuses on knowledge infusion and skill training and is relatively lacking in terms of an awareness of responsibility and service, has failed to meet people's needs. Therefore, the development of humanistic literacy is very important.

Humanistic literacy refers to a person's inner spiritual nature, which is reflected in their temperament and value orientation(1). Some studies have shown that humanistic care can improve the quality of life of patients and contribute to their recovery(2). Humanistic literacy also contributes to the quality of life and productivity of hospital staff (3). The object of study of medicine is human, therefore, medicine also has humanistic attributes(4). Medical students are the future doctors and the main body of future medical activities(5). The cultivation of humanistic spirit of medical students is directly related to the development of comprehensive quality of medical talents. The shaping of the humanistic spirit of medical students is directly related to the improvement of the doctor-patient relationship and the transformation of the medical model. Improving the humanistic spirit of medical students helps to create a good medical environment and enhance effective communication between doctors and patients(6).

Medical education departments need to strengthen their humanities sociology curriculum and improve the humanistic quality of medical students while increasing their medical knowledge and skills. Throughout the United States (US), United Kingdom (UK), other Western countries, and some Asian countries like Japan, many medical universities have already integrated the learning of medical humanities in their curricula and recognized their value(7). Over the past 20 years, humanistic quality for medical students has become an important research topic. Medical students’ humanistic quality has attracted scholarly attention in China, and a significant amount of related literature has been published. A few scholars have explored the integration of the humanistic spirit into the training for medical students(8, 9), and others have investigated the current situation of the humanistic quality(10). Research subjects included students from vocational and technical schools and high-level graduate students(11). At the moment, no scholars have used bibliometric methods to study humanistic literacy among medical students. The bibliometric study of the humanistic quality in medical students can complement medical education research to promote the development of such education.

CiteSpace is a commonly used statistical analysis tool based on the Java environment, designed by Chen(12). Using the co-citation analysis theory and pathfinder network scaling, it can analyze literature in
specific fields and explore the developing trends of related disciplines by drawing a series of visualized atlases(13). CiteSpace, a common tool to carry bibliometric analysis, can provide intuitive information and potential future study directions for researchers(14). The design of the tool is based on the basic assumption that “scientific knowledge is constantly changing”(15, 16). CiteSpace can effectively help researchers better understand the research fields they are engaged in: it can not only show the overall situation of a research field but also highlight some specific important documents in the development process of the field(17). Research hotspots mean significant research topics/themes in a specific field and a certain period. Research hotspots are the focus of many scholars in the field, and keywords are often used during Citespace analyses to identify hotspots in the research field(16). No study has yet used CiteSpace to conduct a quantitative overview of medical students' humanistic quality. The research purpose was to address the following three key research questions (RQs) in the context of medical schools in China.

RQ1. What is the chronological growth of published articles on medical students' humanistic literacy in China?

RQ2. Who are the major contributors (authors and institutions) to research on medical students' humanistic literacy in China?

RQ3. What are the research hotspots on humanistic literacy among medical students in China?

Therefore, this study used CiteSpace software to conduct bibliometric analysis for research on medical students' humanistic quality, to review the related research from 1995–2022, manage active authors, journals, institutions, and keywords involved in the research, highlight research hotspots, help researchers extract potentially valuable information for further research, and provide meaningful guidance for the selection of cutting-edge topics.

**Methods**

**Data Source**

First, we collected data from the China Knowledge Network (CNKI) database, which is the largest and most authoritative scientific literature database platform in China (18). Moreover, CNKI has a collection of scientific literature from more than 7000 academic journals, which ensures the representativeness and authority of the literature sources(19). The only database used in this review was China Knowledge Network (CNKI), which centralises all the various data sources traditionally used for systematic reviews of all available data sources. Secondly, we used the term medical students' humanistic quality as the topic, to retrieve all of the relevant documents published from 1995 to 15 April 2022, generating a total of 956 documents. We set 1995 as the beginning of our date range because the first relevant article appeared in the CNKI database in 1995. In addition, the articles in the CNKI database were written in Chinese. Thirdly, among all the various types of documents available, articles published in journals were found to be relatively more continuous, sensitive, and directly related to the academic field. To ensure the rationality
and validity of the data, we carefully read the 956 documents selected and manually removed a total of 15 documents of various types, such as duplicate documents, research reports, meeting announcements, and book reviews. 941 records were generated and processed on CiteSpace on April 15, 2022.

**Methodology**

Bibliometrics refers to the application of mathematical and statistical methods to objectively analyze the distribution of scientific literature over a period in a specific field (20). Bibliometrics can be used to reveal the cooperative relationships among authors, institutions, and countries, thereby identifying influential researchers, research hotspots, research frontiers, and future research trends in certain fields (21, 22). To date, bibliometric analysis has been widely used in the fields of nursing (23), forensic toxicology (24), and press and publication (25). CiteSpace software, a knowledge management tool, was developed by Professor Chen Chaomei. It is used to analyze quantitative literature (26). This study used CiteSpaceV6.1 R1 Basic for a partner and co-word analysis. The six-step procedure was as follows: (1) installing CiteSpace software in the Java environment, (2) collecting and downloading data, (3) setting parameters, (4) running CiteSpace, (5) visualizing data, and (6) exporting the visual atlas.

**Paths of Analysis**

To answer the research questions, we used CiteSpace to conduct two paths of analysis: co-authorship analysis and co-word analysis. Co-authorship analysis is built into the bibliometric record analysis using authors and institutions as nodes to identify influential scholars or institutions by frequency (i.e. number of papers published), with authors or institutions with a high frequency being identified as influential/leading/core authors or institutions (27). Co-word analysis is designed to measure the correlation strength between words in different documents by visualizing the results into groups, or clusters (28). This study took keywords as nodes in the co-word analysis. This is because keywords provide information about the core content of articles. Keywords are words that express the subjective concepts of a book or other form of literature. They are the result of a high level of generalization of the author’s academic thoughts and views and can reflect the core content of the literature under analysis. Therefore, if a keyword repeatedly appears in the literature of a certain field, it can reflect the fact that the particular research topic represented by the keyword should be considered a research hotspot in that field.

**Results**

**Research literature time distribution**

In total, 941 published documents were found in the selected databases from 1995 to April 2022. Figure 1 shows the number of documents published each year. The first study on medical students’ humanistic literacy was published in 1995; therefore, 1995 was the starting point of our study. The number of publications per year has increased over the past two decades, despite some inverted-s-shaped fluctuations. As shown in Fig. 1, research on the humanistic quality of Chinese medical students has undergone three stages of development: slow (1995–2009), rapid (2010–2019), and stable (2020–2022).
In the slow development phase (1995–2009), 94 articles were published, accounting for only 10% of the total publications. It is noteworthy that no research was recorded from 1996 to 2000, indicating that no scholars paid attention to the research on medical students' humanistic quality, or that research on this topic was still in the exploratory stage. In the rapid development phase (2010–2019), the number of publications increased each year, and during this period, 687 articles were published, accounting for approximately 73% of the total number of articles. In the stable development phase (2020–2022), 160 articles were published, and the number of publications per year in this phase decreased slightly. In summary, it can be shown that since 2010, the study of the humanistic qualities of medical students has become a mainstream research topic in the field of education in China, with the number of papers published on this topic peaking at 100 in 2019. In China, the study of humanistic qualities of medical students is a leading research topic in the whole field of education. In summary, this is still a young field, as most papers were published in the past decade or so.

Table 1 lists the top 10 journals that pay the most attention to the humanistic quality of medical students in China. However, it should be noted that among the 941 articles, only 178 were published in these top 10 journals, accounting for 18.91% of the included research articles. Among them, *Chinese Medical Ethics* and *Ability and Wisdom* ranked first, with 29 publications, followed by *Health Vocational Education* and *Education and Teaching Forum*, with 24 publications, and *Education Modernization*, with 17 articles. It should be noted that the top five journals are the most authoritative in China and have published articles of the highest quality in communication. The 10 journals with the largest number of published studies are listed in Table 1, which can provide important references for new researchers.

<table>
<thead>
<tr>
<th>journal</th>
<th>Number communications</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Chinese Medical Ethics</em></td>
<td>29</td>
</tr>
<tr>
<td><em>Ability and Wisdom</em></td>
<td>29</td>
</tr>
<tr>
<td><em>Health Vocational Education</em></td>
<td>24</td>
</tr>
<tr>
<td><em>Education and Teaching Forum</em></td>
<td>24</td>
</tr>
<tr>
<td><em>Education Modernization</em></td>
<td>17</td>
</tr>
<tr>
<td><em>Higher Medical Education in China</em></td>
<td>13</td>
</tr>
<tr>
<td><em>Occupation</em></td>
<td>12</td>
</tr>
<tr>
<td><em>Industrial &amp; Science Tribune</em></td>
<td>10</td>
</tr>
<tr>
<td><em>China Continuing Medical Education</em></td>
<td>10</td>
</tr>
<tr>
<td><em>Quality Education in the West</em></td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1

Top 10 journals by the number of published articles

Analysis of main contributors and coauthors
The research on the humanistic quality of Chinese medical students has become a noteworthy issue that has received different degrees of attention from scholars and institutions. To explore the cooperative relationship between authors or institutions and to identify the main authors or institutions involved in research on the humanistic quality of medical students, we used CiteSpace for the co-author analysis and generated Figs. 2 and 3, which show author and institution cooperation, respectively.

The author's cooperation diagram shows the cooperation between authors and identifies the main authors for the studies on the humanistic quality of Chinese medical students. CiteSpace was used for the co-author analysis (i.e., the node was set to "author"), and an author collaboration map was generated, as shown in Fig. 2. Figure 2 is composed of nodes that represent authors and lines that describe the author relationships between the nodes. Larger nodes (determined by the number of publications) are generally identified as important ones that may have a significant impact on scientific research. A thicker line between two nodes indicates a closer relationship. Figure 2 shows 483 authors (nodes) and 254 collaboration relationships (connections).

The top scholars in medical students' humanistic quality were Jian Ruiqiao and Li Min, with five and four published articles, respectively. Six authors published three articles each: Zhou Yafu, Zheng Lin, Yu Ningbo, Tang Zhihan, Ding Anying, and Zhang Xinhua. The volumes and percentages for the eight most productive authors are listed in Table 2, which provides highly personalized important scientific research information for other researchers.

<table>
<thead>
<tr>
<th>Number</th>
<th>Author</th>
<th>Frequency</th>
<th>Proportion</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jianrui Qiao</td>
<td>5</td>
<td>0.53</td>
<td>2012</td>
</tr>
<tr>
<td>2</td>
<td>Li Min</td>
<td>4</td>
<td>0.43</td>
<td>2018</td>
</tr>
<tr>
<td>3</td>
<td>Zhou Yafu</td>
<td>3</td>
<td>0.32</td>
<td>2014</td>
</tr>
<tr>
<td>4</td>
<td>Zheng Lin</td>
<td>3</td>
<td>0.32</td>
<td>2012</td>
</tr>
<tr>
<td>5</td>
<td>Yu Ningbo</td>
<td>3</td>
<td>0.32</td>
<td>2014</td>
</tr>
<tr>
<td>6</td>
<td>Tang Zhihan</td>
<td>3</td>
<td>0.32</td>
<td>2010</td>
</tr>
<tr>
<td>7</td>
<td>Ding Anying</td>
<td>3</td>
<td>0.32</td>
<td>2015</td>
</tr>
<tr>
<td>8</td>
<td>Zhang Xinhua</td>
<td>3</td>
<td>0.32</td>
<td>2010</td>
</tr>
</tbody>
</table>

To explore partnerships and identify influential institutions, we use CiteSpace to generate an institutional network diagram. The parameters remained the same—except for node type was changed from author to mechanism. Figure 3 shows the nodes and lines, where the nodes represent the mechanism and the lines describe the relationship between the node mechanisms. The figure identifies 167 institutions (nodes) and 23 partnership (lines) co-occurrences, with high-frequency (many publications) nodes being identified.
as more important and having a significant impact on the development of scientific research. A thicker line between two nodes indicates a closer relationship.

Dalian Medical University, North Sichuan Medical College, and Hainan Medical College are the top three research institutions in the humanistic quality research of medical students. These have published six research papers. Three or more research papers were published by the 10 research institutions, as shown in Table 3.

Table 3
Most productive institutions

<table>
<thead>
<tr>
<th>Number</th>
<th>Organization</th>
<th>Frequency</th>
<th>Proportion</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dalian Medical University</td>
<td>6</td>
<td>0.64%</td>
<td>2006</td>
</tr>
<tr>
<td>2</td>
<td>North Sichuan Medical College</td>
<td>6</td>
<td>0.64%</td>
<td>2014</td>
</tr>
<tr>
<td>3</td>
<td>Hainan Medical College</td>
<td>6</td>
<td>0.64%</td>
<td>2017</td>
</tr>
<tr>
<td>4</td>
<td>Luzhou Medical College</td>
<td>3</td>
<td>0.32%</td>
<td>2008</td>
</tr>
<tr>
<td>5</td>
<td>Medical College of Shanghai Jiaotong University</td>
<td>3</td>
<td>0.32%</td>
<td>2012</td>
</tr>
<tr>
<td>6</td>
<td>Xinxiang Medical College</td>
<td>3</td>
<td>0.32%</td>
<td>2019</td>
</tr>
<tr>
<td>7</td>
<td>Teacher Education College of Daqing normal college</td>
<td>3</td>
<td>0.32%</td>
<td>2020</td>
</tr>
<tr>
<td>8</td>
<td>Henan Vocational College of Nursing</td>
<td>3</td>
<td>0.32%</td>
<td>2013</td>
</tr>
<tr>
<td>9</td>
<td>Xuzhou Medical University</td>
<td>3</td>
<td>0.32%</td>
<td>2018</td>
</tr>
<tr>
<td>10</td>
<td>Sichuan College of Architectural Technology</td>
<td>3</td>
<td>0.32%</td>
<td>2017</td>
</tr>
<tr>
<td>11</td>
<td>University of South China Medical school</td>
<td>3</td>
<td>0.32%</td>
<td>2010</td>
</tr>
<tr>
<td>12</td>
<td>Jiangxi Nursing Vocational and technical college</td>
<td>3</td>
<td>0.32%</td>
<td>2012</td>
</tr>
<tr>
<td>13</td>
<td>School of Public Health and management Weifang medical college</td>
<td>3</td>
<td>0.32%</td>
<td>2017</td>
</tr>
</tbody>
</table>

Research hotspots and frontier analysis

The analysis of keyword co-occurrence intuitively reflects and summarizes the current research hotspots and common researcher concerns (29) To identify research hotspots in medical students' humanistic quality, we used CiteSpace for keyword co-occurrence analysis. The parameters in CiteSpace were kept unchanged, except that the node type was changed from "Institution" to "Keywords," and a keyword co-occurrence map was generated. The graph consists of lines and nodes, where a larger node indicates that a specific keyword appears more frequently at the same time as other keywords. The thickness of the line further reflects the co-occurrence intensity of the two keywords. The keyword co-occurrence graph shown in Fig. 4 consists of 645 nodes and 2,172 connecting lines between the nodes. Each node represents a
keyword. Larger nodes reflect higher co-occurrence frequencies, and the link between each of the two keywords shows a co-occurrence relationship.

Keywords are the highly condensed content of literature research. The keyword co-occurrence network obtained from the keyword co-occurrence function can reflect the current and past research hotspots in a specific field. The key words of the humanistic quality research of medical students are shown in Table 4. The keywords more than 100 times were: “humanistic literacy,” “medical students,” and “humanistic quality.” Those with a centrality greater than or equal to 0.1 were “humanistic quality,” “medical students,” “humanistic literacy,” and “medical students.” These keywords can be considered the focus of research in this field, indicating that they were either open academic issues, key research methods, or hot topics of interest to researchers.

<table>
<thead>
<tr>
<th>Number</th>
<th>Keyword</th>
<th>Frequency</th>
<th>Centrality</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Humanities accomplishment</td>
<td>626</td>
<td>1.16</td>
<td>2001</td>
</tr>
<tr>
<td>2</td>
<td>Medical student</td>
<td>226</td>
<td>0.18</td>
<td>2002</td>
</tr>
<tr>
<td>3</td>
<td>Humanistic quality</td>
<td>120</td>
<td>0.22</td>
<td>2004</td>
</tr>
<tr>
<td>4</td>
<td>Medical student</td>
<td>88</td>
<td>0.10</td>
<td>2004</td>
</tr>
<tr>
<td>5</td>
<td>Humanistic literacy</td>
<td>44</td>
<td>0.05</td>
<td>2004</td>
</tr>
<tr>
<td>6</td>
<td>Higher vocational students</td>
<td>35</td>
<td>0.01</td>
<td>2011</td>
</tr>
<tr>
<td>7</td>
<td>Higher vocational colleges</td>
<td>32</td>
<td>0.02</td>
<td>2003</td>
</tr>
<tr>
<td>8</td>
<td>Student</td>
<td>29</td>
<td>0.03</td>
<td>2005</td>
</tr>
<tr>
<td>9</td>
<td>Arts &amp; Humanities education</td>
<td>28</td>
<td>0.07</td>
<td>2005</td>
</tr>
<tr>
<td>10</td>
<td>Medical Education</td>
<td>27</td>
<td>0.02</td>
<td>2001</td>
</tr>
</tbody>
</table>

**Discussion**

As people's health needs and expectations grow, so does the awareness of the weaknesses in medical humanistic care and other emergent problems. Patients want humanized medical care. The humanistic literacy of medical students studied has attracted considerable attention. The research is valuable in three ways. Firstly, it summarizes the development status and ideological basis of humanistic literacy among Chinese medical students while analyzing important research questions; secondly, it provides an important reference for researchers to obtain a correct understanding of humanistic literacy research among Chinese medical students; thirdly, it helps researchers to grasp the scientific development and research questions in the field of humanistic literacy among Chinese medical students.
In terms of the temporal distribution of publications, increasing attention has been directed toward the humanistic literacy of Chinese medical students' research over time from 1995 to 2022 in China. Research on the humanistic quality of medical students stabilized after a period of rapid growth in the last 15 years. Currently, this topic is academically popular. Related theories and analytical methods are being gradually developed. From 1995 to 2022, China paid much attention to research on the humanistic quality of medical students in terms of the time distribution of publications. The first article by Huazhong University of Science and Technology was “On Improving Students' Humanistic Quality and Chinese Language Level.” It was published in 1995 in *Higher Engineering Education Research*. This was the first time the question of students' humanistic quality had ever been raised. In the following five years, the issue of humanistic quality was encouraged and spoken about. In 2001, an article titled “Strengthening Humanistic Education in Medical Education” opened doors to humanistic quality education for medical students. In 2022, the number of related articles on medical students' humanistic qualities increased. The humanistic literacy of medical students is also included in the expert consensus on humanistic education in dentistry, which requires that the new era of medicine requires students to have medical humanistic literacy (30). Some studies have shown that offering humanities classes in medical schools can develop humanistic literacy in medical students(6). By developing the humanistic qualities of doctors, we can effectively improve the doctor-patient relationship(19, 31). This study found that medical experts and educational scholars have been the main force driving research on humanistic quality among Chinese medical students. This is consistent with some international studies in which some international medical educators have called for modern medical education to be oriented toward humanistic literacy education(32). This study aimed to search the published literature using CiteSpace analysis to provide personalized ideas to guide future research in the field.

Scientific cooperation is a process in which two or more authors share their resources and talents and create studies together(33, 34). A good cooperative relationship among scholars can establish an academic network aimed at sharing innovative ideas and concepts, generating new knowledge, ultimately reducing the waste of academic resources, and improving research productivity(35). This study found that the density of the author collaboration graph was 0.0022, indicating that only 0.22% of the potential relationships in the medical student humanistic literacy research network were realized. This is similar to studies in other medical fields, where scientific collaboration is rare and needs to be strengthened(36). Furthermore, this indicates that a strong partnership has not been formed among authors in medical students' humanistic quality. The density of the cooperative agency atlas was 0.0017, implying that only 0.17% of the potential relationships among medical students' humanistic literacy research institutions have been realized. This further shows that cooperation between institutions and scholars is weak. Strong partnerships have not been established yet. Because cooperative studies in this field are few, the centrality of scholars and institutions is not obvious. Researchers and institutions mostly study alone in the present situation. They have not yet formed a cooperative system. There are relevant studies that show that strengthening collaborative behaviour, especially between different institutions or countries/regions, will promote the progress and internationalization of research(37). Researchers need
to focus on representative collaborations of scholars and institutions that can help us advance our research.

To identify important research topics in the humanistic quality of Chinese medical students' research, the study conducted a keyword co-occurrence analysis. Co-occurring keywords reflect research hotspots in the field (38, 39). In terms of research hotspots, scholars have shown great interest in humanistic quality and literacy and medical students. Additionally, the accomplishments of higher vocational and higher vocational college students have been widely discussed. Research on the humanistic quality of Chinese medical students has become more diversified and detailed. Medical colleges lead the study on medical students' humanistic quality in China. They determine the direction and focus of such a study. Through visual analysis of the research literature on this topic, this study provides scholars committed to this field with research characteristics and hotspots evolution trends. Moreover, it provides direction, guidance, and information on the practical methodology for subsequent research into issues related to the medical education system.

The Health China strategy has put forward new requirements for medical education. Medical education in the context of the new medical model needs to effectively deal with complex humanistic elements. During the implementation of the new medical strategy, the scope of medical risks has expanded and the awareness of patients' rights has increased, humanistic literacy should be integrated into medical education to help doctors develop appropriate literacy and competence. Humanistic literacy education is an alternative path to try to solve complex problems through medicine and humanities in compliance with the change of medical education approach. By cultivating the humanistic literacy of medical students, we can achieve improvement in the doctor-patient relationship, reshape the medical humanistic environment, and improve the quality and level of new medical education.

**Research limitations**

To our knowledge, our study is the first bibliometric analysis of publications related to humanistic literacy among medical students. Nevertheless, this study has some limitations. First, there may be language bias because although we did not set any restrictions on the language of the publications in our study, most CNKI publications were in Chinese. Second, the quality of CNKI publications varies. We lacked a quality assessment of publications, and our analysis may have given equal attention to publications of different quality. Finally, the data currently used for the analysis were extracted only from CNKI and did not include data from other search engines such as Scopus (Elsevier), PubMed, or Google Scholar (Google LLC). Therefore, it is possible to miss publications that appear only through one of these other search engines. We plan to address this issue by exploring ways to combine different data sources in future work.

**Conclusion**

The present study demonstrated a quantitative scientometric method and explored the progress of medical students' humanistic quality research using references published in the field. This study analyzes
the development of and problems with medical students' humanistic quality research. This analysis provides an important reference for researchers to understand Chinese medical students' humanistic quality research better.

The visual knowledge map produced by CiteSpace provides a deep understanding of the main authors, institutions, and research hotspots involved in Chinese medical students’ humanistic literacy. These results can provide valuable information to researchers and practitioners. In contrast to previous research, this study reviewed research into the humanistic quality of medical students as a whole, rather than emphasizing or paying special attention to one of its sub-fields. Additionally, it objectively reviewed the literature related to the humanistic quality of medical students using bibliometric analysis, which supplements a qualitative review of the humanistic quality of early medical students.

The study found that the number of humanities publications medical students increased every year over the past two decades, despite a certain diagram showing an inverted S-shaped fluctuation. Research on improving the humanistic quality of Chinese medical students is predominantly conducted by medical colleges. No single author or institutional core group dominates the field of research on medical students’ humanistic qualities. The main study focuses on humanistic qualities, medical students, higher vocational students, and higher vocational colleges.

In conclusion, this study provides valuable information to potential collaborators and institutions, thus shedding light on trends in humanistic literacy research for medical students, which may provide new directions for further research.

Declarations

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Availability of data and materials

All data and materials are available upon request to the corresponding author.

Authors’ contributions

Pang Jie, Luo Ming-wei and Xu Hua-min developed the theoretical, methodological and empirical basis for this project. Xie Shi-wei and Yan Jing collected the data. Luo Ming-wei, Xie Shi-wei and Yan Jing carried out the analysis. All authors participated in the discussion of the results and in drafting and revising the manuscript. All authors read and approved the final manuscript.
Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Confirmation statement

The source database is publicly accessible and the data are freely available by mail at the corresponding author.

References


**Figures**

![Figure 1](image)

**Figure 1**

Time distribution of research articles on the humanistic quality of Chinese medical students
Figure 2

Cooperative network diagram of authors of research into the humanistic literacy of medical students
Figure 3

Institutional cooperation network diagram for research into the humanistic literacy of medical students
Figure 4

Co-occurrence diagram of keywords in the research field of medical students' humanistic quality