Trends in Traditional Chinese Medicine Research on Dementia Based on Bibliometric Analysis and Evaluation of Clinical Applications

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Abstract: This study employs bibliometric methods to systematically analyze global research trends and developments in Traditional Chinese Medicine (TCM) for dementia treatment from 1990 to 2024. A total of 2,497 English-language publications retrieved from the Web of Science Core Collection were included. Using the R package bibliometrix and the bibliometric.com platform, indicators such as academic publishing trends, journal distribution, author collaboration patterns, keyword co-occurrence, and country-level research outputs were analyzed. The study also explores the impact of economic factors on research productivity. Furthermore, two clinical cases of Alzheimer's disease patients treated with Bazhimu Decoction were included, with assessments via MMSE, ADAS-cog, and Activities of Daily Living (ADL) scales to preliminarily verify its potential for cognitive improvement. Results indicate China as the major contributing country, with a strong positive correlation between national GDP and citation counts. Research focuses include pathological mechanisms, inflammation regulation, and quality of life enhancement. Clinical cases of Bazhimu Decoction also showed signs of cognitive and functional improvement, suggesting the application value and development potential of TCM in dementia treatment. Future research should strengthen interdisciplinary collaboration and conduct large-scale clinical validations to promote the scientific rigor and clinical utility of this field.

Keywords: Traditional Chinese Medicine, TCM, Dementia, Bibliometrics, Alzheimer's Disease, Bazhimu Decoction, Cognitive Function, Clinical Case, Global Research Trends, International Collaboration

1. Introduction

In recent years, dementia has become a significant global public health challenge. According to the World Health Organization (WHO), approximately 55 million people worldwide suffer from dementia, and this number is expected to rise to 152 million by 2050 [1,2]. Dementia not only severely impairs patients' cognitive functions and ability to perform daily activities but also increases the caregiving burden on families and society [3]. Currently, treatments for dementia mainly focus on symptom management, with no curative therapies available, prompting the medical community to actively seek new therapeutic strategies. Traditional Chinese Medicine (TCM), which emphasizes holistic regulation and syndrome differentiation-based treatment, contains various active compounds with neuroprotective and antioxidant properties, showing potential in the prevention and treatment of dementia [3-5]. For example, many TCM

herbal formulas have been found to regulate neurotransmitters, reduce neuroinflammation, and inhibit β-amyloid protein deposition—mechanisms consistent with modern neuroscience research [6]. With increasing global demand for alternative therapies, research and application of TCM in dementia continue to expand; however, limitations remain, including insufficient clinical evidence, inconsistent study designs, and a lack of international collaboration [7,8].

This study aims to apply bibliometric analysis [9,10] to systematically review the literature on TCM treatment of dementia over the past decade, analyzing research hotspots, academic collaboration networks, and development trends to reveal the academic landscape and potential future directions of this field. Additionally, clinical case studies are integrated to explore the practical application of the herbal formula Bazhimu Decoction in Alzheimer's disease treatment, providing scientific evidence and clinical references for the use of TCM in dementia prevention and treatment.

2. Research Methods

This study employed bibliometric methods to systematically analyze the global research trends and current developments in the field of Traditional Chinese Medicine (TCM) for dementia treatment. Data were sourced from the Web of Science Core Collection (WoSCC), with a retrieval period spanning from 1990 to 2024. The search keywords included "Chinese Medicine," "Dementia," and "Aging," and only English-language publications were included. A total of 2,497 documents were retrieved, encompassing various types such as journal articles, book chapters, conference proceedings, editorials, and reviews.

For analysis, the R package bibliometrix and the online platform bibliometric.com were utilized. Key evaluation metrics included academic publication trends, journal distribution, authorship collaboration patterns, keyword co-occurrence networks, and research output by country. Additionally, correlation analyses were conducted to explore relationships between publication volume and national economic indicators, including gross domestic product (GDP), research and development (R&D) expenditure as a percentage of GDP, and the number of dementia patients, aiming to assess the influence of economic factors on scholarly productivity in this field.

Beyond bibliometric analysis, the study incorporated a clinical case investigation involving two Alzheimer's disease patients, aged 68 and 85, respectively, treated with the TCM herbal formula Bazhimu Decoction. Each patient received a daily dose of 200 mL decoction for three consecutive months. Cognitive changes were assessed using the Mini-Mental State Examination (MMSE) and the Alzheimer's Disease Assessment Scale–Cognitive Subscale (ADAS-cog). Improvements in activities of daily living (ADL) and TCM syndrome patterns were also evaluated to provide a comprehensive assessment, preliminarily validating the clinical potential of Bazhimu Decoction in mitigating cognitive decline.

3. Results and Analysis

Between 1991 and 2024, a total of 2,497 publications related to Traditional Chinese Medicine (TCM) treatment for dementia were published worldwide, distributed across 641 academic journals, indicating a sustained increase in research activity in this field, as illustrated in Figure 1. Regarding journal

distribution, high-impact journals such as *Neurology*, *Alzheimer's & Dementia*, and *Journal of Alzheimer's Disease* ranked among the most frequently cited, reflecting the academic value and international recognition of research outcomes in this domain.

Figure 1: Annual Publication Summary (1991–2024)

From a geographical perspective, China led global publication volume with 1,919 articles, accounting for 76.9% of the total output, with approximately one-quarter of these involving international collaborations. The United States and Singapore contributed 156 and 134 publications respectively, both exhibiting notably higher collaboration rates of 66.0% and 49.3%. The United Kingdom and Australia demonstrated even higher international collaboration proportions, reaching 91.7% and 80.0%, respectively, while all French studies were conducted through multinational cooperation. This highlights a high degree of integration between European, American, and select Asian countries in TCM research on dementia, as depicted in Figure 2.

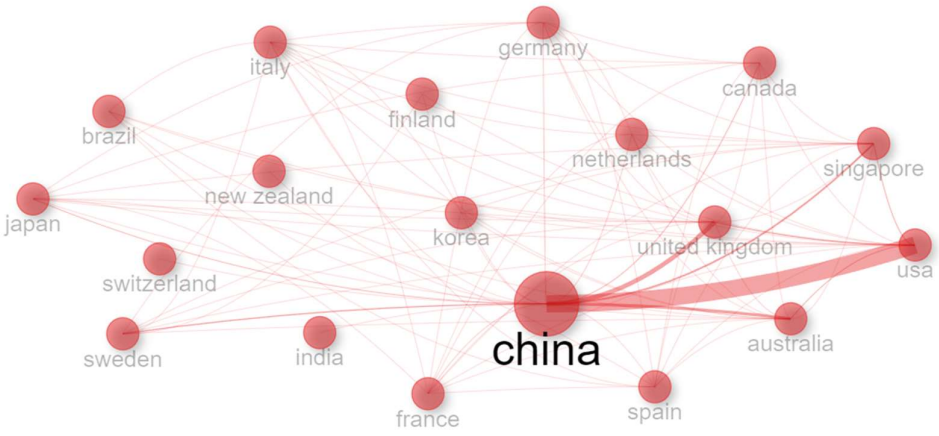

Figure 2: Country Distribution and Collaboration Network

In terms of economic investment, a strong positive linear correlation was found between national GDP and total citation counts within this research area ($R^2 = 0.9161$), indicating a close association between

economic strength and research impact. Both the United States and China excelled in R&D expenditure as a proportion of GDP as well as publication volume, further supporting the significant role of resource allocation in research productivity.

Keyword co-occurrence analysis, summarized in Figure 3, identified high-frequency terms such as “dementia,” “Alzheimer’s disease,” “oxidative stress,” “inflammation,” “biomarkers,” and “Chinese,” suggesting research foci that span the pathological mechanisms of dementia, biomarker discovery, TCM syndrome differentiation, and holistic treatment strategies. Additionally, frequent appearances of terms related to “depression” and “quality of life” underscore researchers’ attention to patients’ mental health and wellbeing.

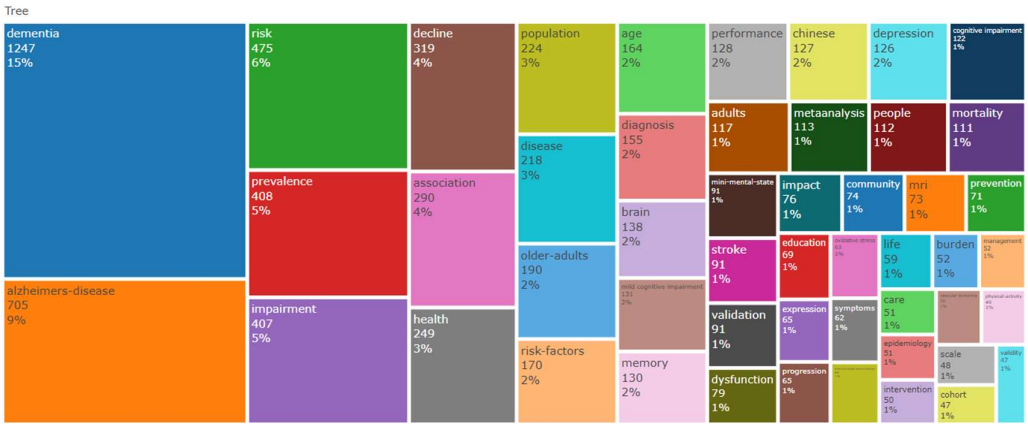

Figure 3: High-Frequency Keywords and Thematic Clustering

Thematic evolution over time reveals clear trends. Earlier studies predominantly focused on diagnostic techniques and fundamental pathological mechanisms, such as biomarker identification. More recent research has shifted towards community health, public health interventions, and the integration of holistic TCM therapies, with particular emphasis on non-pharmacological approaches to enhancing psychological wellbeing and cognitive function.

Clinically, the case observations of two Alzheimer’s disease patients treated with Bazhimu Decoction demonstrated marked improvements in cognitive function and daily living abilities after three months of treatment. One patient’s MMSE score improved from 15 to 22, while the other’s ADAS-cog score decreased from 36.1 to 13.8, accompanied by improvements in TCM syndrome patterns. These preliminary findings suggest that Bazhimu Decoction may have potential clinical benefits in slowing cognitive decline.

4. Discussion

The results of this study demonstrate that Traditional Chinese Medicine (TCM) is gaining increasing global academic attention and development potential in the field of dementia treatment. Bibliometric analysis reveals a steady growth of research on TCM interventions for dementia over the past three decades, particularly highlighting its potential complementary advantages alongside Western medicine in areas such as cognitive function improvement, inflammation regulation, and enhancement of quality

of life. The frequent appearance of keywords like “oxidative stress,” “inflammation,” and “quality of life” further supports the role of TCM therapies in addressing pathological mechanisms and providing holistic care. Regarding international participation, China leads in publication volume, reflecting its active role in promoting the modernization of TCM and its clinical translation. Meanwhile, countries such as the United States, the United Kingdom, Australia, and Singapore engage extensively through high levels of international collaboration, emphasizing the importance of multinational cooperation in integrating research resources and enhancing academic impact. Notably, some countries with smaller research scales or less developed facilities also actively participate via international partnerships, indicating the field’s openness to cross-cultural and interdisciplinary collaboration.

In terms of clinical evidence, the Bazhimu Decoction case reports included in this study provide preliminary clinical support, showing potential improvements in cognitive function (as measured by MMSE and ADAS-cog) and daily living abilities (ADL) among Alzheimer’s patients, particularly corresponding to TCM syndrome patterns such as “Kidney essence deficiency” and “Phlegm-damp obstruction.” However, due to the limited number of cases and lack of control groups, the efficacy and safety of the formula require further validation through larger-scale, randomized, and multicenter clinical trials. Future research should aim to integrate modern neuroscience, biomarker assessments, and TCM syndrome differentiation to establish a more scientifically rigorous and comprehensive research framework.

Overall, this field is currently at a critical transitional stage, moving from exploratory research toward clinical application. Balancing traditional TCM theories with modern scientific methodologies will be the core challenge and opportunity for advancing TCM dementia research in the future.

5. Conclusion and Recommendations

With the ongoing development of research on Traditional Chinese Medicine (TCM) for dementia treatment, this field has entered a new stage characterized by diversification and internationalization. To deepen its academic value and facilitate clinical application, future research should focus on several key aspects.

First, increased investment and integration of research resources are essential. Governments and relevant institutions should be encouraged to expand funding support for TCM dementia research to enhance both the scale and quality of studies. Second, promoting the establishment of interdisciplinary collaboration platforms is crucial. Integrating expertise from TCM, neuroscience, pharmacology, and public health will foster complementary innovation in theory and technology. Moreover, strengthening clinical evidence through large-scale, rigorous clinical trials and long-term follow-ups is necessary to comprehensively evaluate the safety and efficacy of TCM treatments for dementia. This will improve the scientific foundation and clinical acceptance of these therapies. Additionally, developing personalized treatment strategies based on individual patient characteristics—combining TCM syndrome differentiation principles with integrative approaches such as herbal medicine and acupuncture—can enhance the precision and effectiveness of interventions.

Finally, fostering international academic exchange and cooperation, alongside establishing data-sharing

and collaborative research mechanisms, will promote the globalization of TCM dementia treatment. This will elevate the field's international academic influence and deepen its clinical application.

In summary, advancing TCM dementia research requires coordinated progress in resource allocation, interdisciplinary collaboration, clinical validation, personalized therapy, and international engagement. These efforts are vital to promote the scientific modernization of TCM and fully realize its potential and value in dementia prevention and treatment.

Declaration of competing interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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