

PAPER

Insight into Trends in Traditional Chinese Medicine Research for Dementia Treatment: A Bibliometric Analysis

Jinghui Sung^{1,2}  ,
Zikang Jiang^{1,2},
Yuanpeng Huang^{1,2}

¹Fujian University of
Traditional Chinese Medicine,
Fuzhou, Fujian, China

²Xiamen TCM Hospital
Affiliated to Fujian
University of Traditional
Chinese Medicine, Xiamen,
Fujian, China

acyril0906@gmail.com

ABSTRACT

Traditional Chinese Medicine (TCM) has gained growing global interest in dementia research due to its demonstrated neuroprotective properties—such as antioxidant and anti-inflammatory effects—and its integrative therapeutic approach combining herbal, acupuncture, and lifestyle interventions. This study conducted a bibliometric analysis of 2,497 publications from 1991 to 2024 using the Web of Science database to evaluate trends and future directions in TCM-related dementia research. Results show a steady rise in academic output, increased publication in high-impact journals, and expanding international collaboration. Key developments include the identification of effective herbal treatments, deeper understanding of TCM's neuroprotective mechanisms, and successful integration of traditional practices with modern scientific methods. The study highlights the increasing influence of TCM in dementia care and emphasizes the need for interdisciplinary cooperation, rigorous scientific validation, and personalized approaches to further enhance its clinical value and global acceptance.

KEYWORDS

Traditional Chinese Medicine (TCM), dementia treatment, academic research, bibliometrics, journal distribution, global research trends

1 INTRODUCTION

Dementia comprises a spectrum of progressive neurological disorders that significantly impair memory, cognitive functions, and behavioral patterns, ultimately disrupting an individual's ability to perform daily activities. Among these, Alzheimer's disease is the most prevalent, accounting for approximately 60–70% of all dementia cases. Other major forms include vascular dementia, Lewy body dementia, and frontotemporal dementia-related diseases. Mixed dementia, which involves overlapping characteristics of different types, also poses a diagnostic challenge in clinical practice [1–3]. According to the World Health Organization's Global Action Plan on the Public Health Response to Dementia 2017–2025, dementia has emerged as a major global

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health concern due to its rising prevalence and its extensive impact on healthcare systems worldwide [4]. As of 2015, the number of people affected by dementia had reached 47 million, representing about 5% of the global elderly population. This figure is projected to rise to 75 million by 2030 and could reach 132 million by 2050. Additionally, around 9.9 million new dementia cases are diagnosed annually, with a growing burden on low- and middle-income countries, where healthcare resources are often limited [5–9].

The increasing incidence of dementia not only impacts patients and their families on a personal level but also contributes to a significant socioeconomic burden. Currently, dementia accounts for 11.9% of years lived with disability caused by non-communicable diseases, and the global costs of dementia care have reached 1.1% of the total global gross domestic product (GDP). This economic burden is expected to rise dramatically, with dementia care costs projected to hit two trillion USD by 2030. These figures underline the urgency for effective strategies in prevention, treatment, and long-term care, especially in societies with rapidly aging populations [10].

In response to the complex and evolving challenges posed by dementia, both Western medicine and Traditional Chinese Medicine (TCM) have been exploring various treatment pathways. Western medicine has made considerable progress in symptomatic relief and slowing disease progression through pharmacological interventions. Current drugs can help manage memory loss, confusion, and behavioral symptoms, potentially improving patients' quality of life and independence. However, these treatments are not curative; they come with notable side effects and high costs and sometimes lead to drug dependence or diminishing effectiveness over time [11–22].

On the other hand, TCM, recognized as an important traditional medical system and cultural heritage, offers a holistic and individualized approach that may contribute to the prevention, treatment, and rehabilitation of dementia. TCM places emphasis on balancing the body's systems, enhancing overall well-being, and targeting root causes rather than just symptoms. Numerous TCM therapies—including herbal medicine, acupuncture, and mind-body practices—have shown potential neuroprotective effects and are being increasingly investigated in dementia research. Integrating TCM into modern healthcare systems provides a complementary avenue for managing dementia, particularly when combined with conventional treatment. Nevertheless, large-scale, high-quality clinical trials are needed to validate the efficacy and safety of TCM interventions, and the challenges of individual variability in response to treatment must be addressed [23–45].

Given the rising interest and potential of TCM in the field of dementia care, a comprehensive analysis of academic research trends is essential. This study employs the Bibliometrix tool [46, 47] to systematically collect and evaluate relevant publications from 1990 to 2024 in the Web of Science database [48]. The objective is to assess the global research landscape on TCM for dementia, identify evolving research trends, highlight the most productive countries and institutions, and examine the relationship between national publication outputs and GDP as an indicator of research investment and capacity.

Furthermore, based on the analytical results, this study aims to propose practical recommendations for future research directions, such as fostering interdisciplinary collaboration between TCM and Western biomedical science, enhancing the methodological rigor of TCM studies, promoting culturally inclusive healthcare models, and encouraging international research exchange. These strategies are crucial to advancing the scientific credibility, global acceptance, and practical application of TCM in the comprehensive management of dementia.

2 METHODOLOGY

This study conducted a systematic bibliometric analysis to examine the current status and trends in research on TCM for dementia treatment. The Web of Science Core Collection (WoSCC) was chosen as the primary data source for its accuracy and scope. On June 10, 2024, we retrieved English-language publications from 1990 to 2024 using keywords such as “Chinese Medicine,” “Dementia,” and “Aging.” Document types included articles, reviews, book chapters, and proceedings, providing a comprehensive view of the field’s development.

Bibliometric analysis was performed using the online platform [48] (<https://bibliometric.com>). We used SPSS to analyze publication trends and employed bibliometric tools to evaluate publication volume, citation counts, keyword frequency, and rankings of countries, institutions, authors, and journals. Co-authorship analysis was conducted to map collaboration networks, with visualizations generated through bibliometric software and the R-based bibliometrix package. A keyword co-occurrence network was constructed to identify evolving research hotspots and detect citation bursts. Additionally, we explored correlations between research output and national factors such as GDP, R&D investment, dementia prevalence, and journal impact factors (IF). This analysis also highlighted major research themes and influential literature in the field. Through these methods, the study offers a comprehensive overview of global research on TCM for dementia, aiming to inform future studies and support interdisciplinary collaboration and strategic development in this area.

3 ANALYSIS RESULTS AND DISCUSSIONS

3.1 Analysis and discussion of collected literature

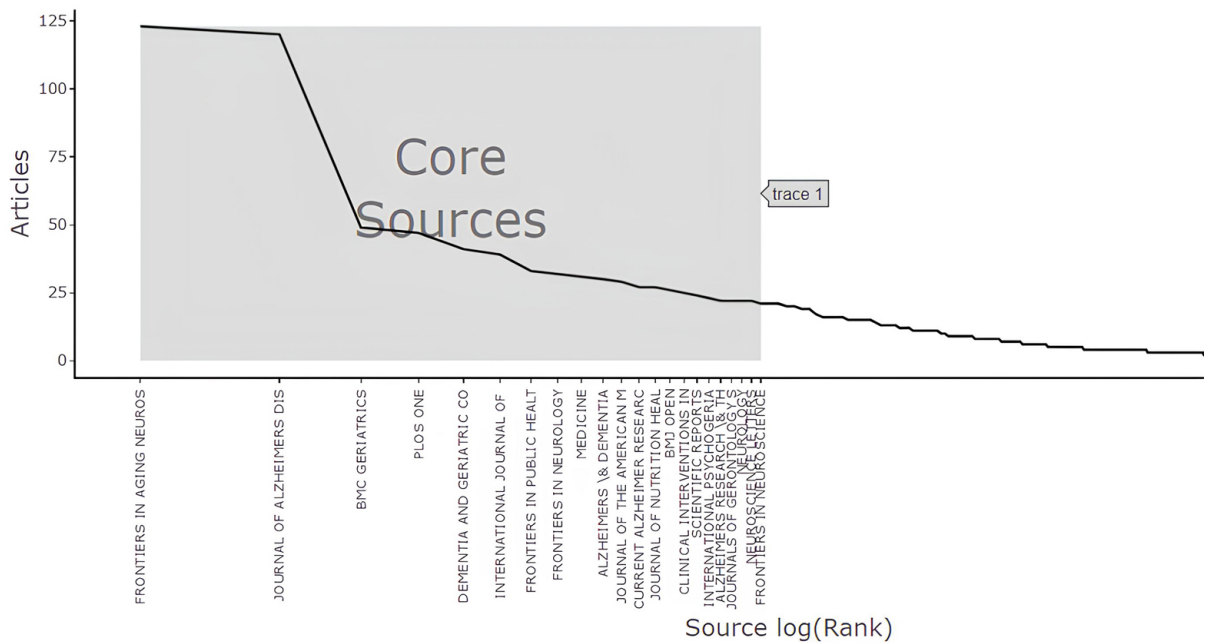
This study analyzed 2,497 publications on TCM and dementia from January 1, 1991, to June 12, 2024, spanning 641 journals. The dataset included 2,201 research articles, 234 reviews, and a small number of book chapters, data papers, editorials, and other document types. A total of 18,331 authors contributed, with only 15 papers authored individually. International collaboration accounted for 33.48% of the publications. Across the dataset, 4,798 unique keywords were identified, and the total number of cited references reached 81,362.

3.2 Analysis and discussion of publication status of collected literature

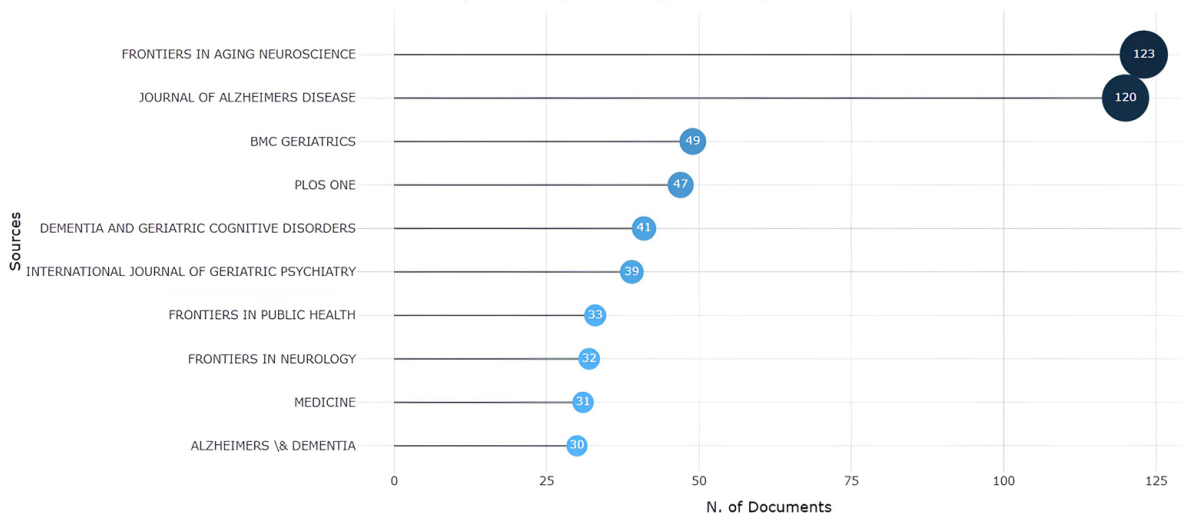
Dementia is a cognitive decline disease that significantly impacts daily life, posing a major challenge to global health. TCM has garnered considerable attention for its potential in managing symptoms associated with dementia. This study analyzes the academic research outcomes of TCM treatment for dementia, with a particular focus on publication trends and influential journals. As illustrated in Figure 1, publication outputs are concentrated in several key journals, suggesting a trend of centralization in research dissemination.

We selected the most cited relevant literature, which is distributed across multiple journals. The following are the journals with the most publications on TCM treatment for dementia and their respective IF: *Frontiers in Aging Neuroscience* (123 articles, IF: 5.605), *Journal of Alzheimer’s Disease* (120 articles, IF: 3.920), *BMC*

Geriatrics (49 articles, IF: 3.212), *PLOS ONE* (47 articles, IF: 2.740), *Dementia and Geriatric Cognitive Disorders* (41 articles, IF: 2.510), *International Journal of Geriatric Psychiatry* (39 articles, IF: 3.758), *Frontiers in Public Health* (33 articles, IF: 3.084), *Frontiers in Neurology* (32 articles, IF: 3.508), *Medicine* (31 articles, IF: 1.806), and *Alzheimer's & Dementia* (30 articles, IF: 14.153). Figure 1a illustrates the core sources of each journal, and Figure 1b depicts the relationship between the number of documents and publication sources.



(a) the core source of publication articles



(b) the relationship of number of documents and sources

Fig. 1. Analysis of publication status of collected literature

These publications reflect a growing interest in exploring TCM as a treatment method for dementia. High-IF journals such as *Alzheimer's & Dementia* and *Frontiers in Aging Neuroscience* underscore the academic importance and broad dissemination

of research outcomes in this field. The diversity across journals highlights the interdisciplinary nature of the research, integrating perspectives from neuroscience, geriatrics, and public health.

3.3 Analysis of publication trends by country

The analysis of publication trends by country highlights the global research development in TCM for dementia treatment since 1991. Figure 2 illustrates annual publication counts across countries, allowing for comparisons of research productivity over time. Notably, significant growth has been observed in Singapore, China, the United States, the United Kingdom, and Australia. From 1991 to 2023, Singapore's publications increased from 1 to 963, with an average annual growth rate of 16.1%, while China experienced a surge from zero to 11,416 publications, with a 20.6% growth rate. The United States also showed growth from zero to 3,545 publications (12.6%), while the United Kingdom and Australia had average annual growth rates of 10.3% and 11.8%, respectively. These trends indicate substantial and consistent research expansion in this field, particularly in China and Singapore.

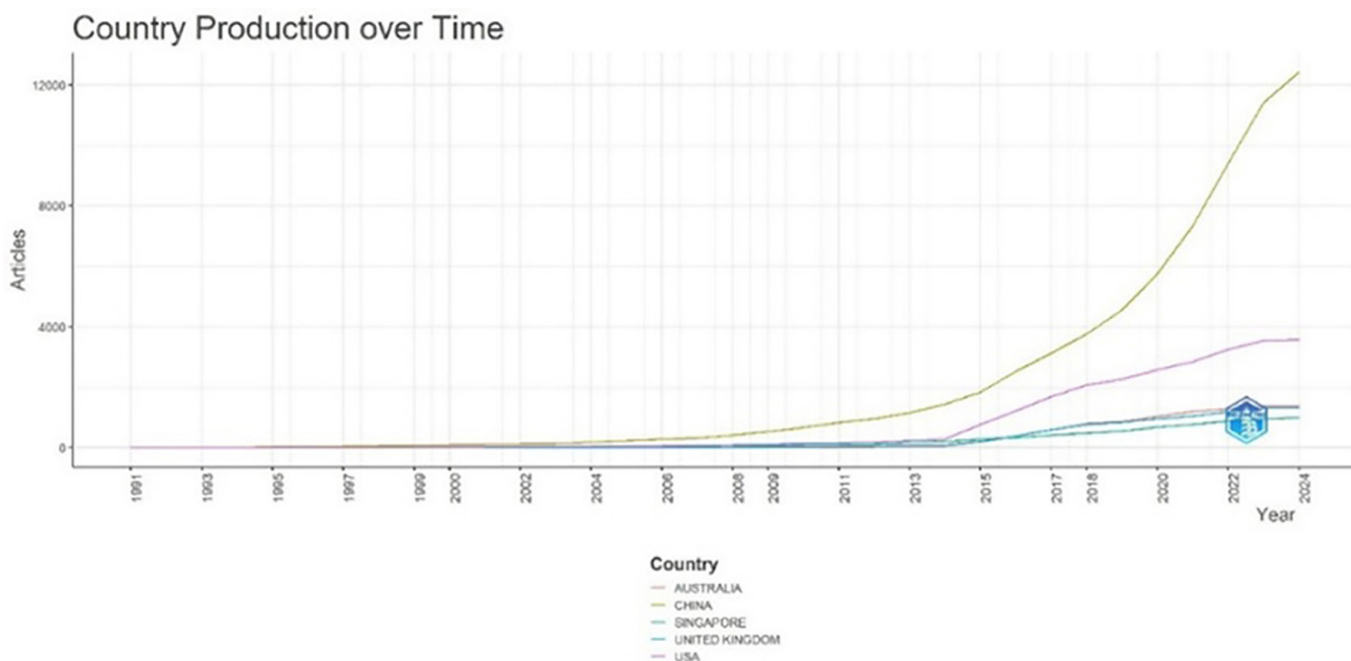


Fig. 2. Analysis of country-wise publication trends over time

3.4 Analysis of publications on Traditional Chinese Medicine treatment for dementia by major countries

An analysis of publications on TCM treatment for dementia from 1991 to 2023, based on data from the Web of Science, reveals clear trends among major contributing countries. Publications were categorized as either Single-Country Publications (SCP) or Multi-Country Publications (MCP), shown in Figure 3, reflecting domestic or international collaborations. China leads significantly with 1,919 papers (76.9% of total), including 1,460 SCP and 459 MCP (MCP%: 23.9%).

The United States follows with 156 publications (6.2%), of which 66.0% were MCP, indicating strong international collaboration. Singapore contributed 134 papers (5.4%) with a balanced split between SCP and MCP (MCP%: 49.3%). Australia and the United Kingdom produced 50 and 48 papers, respectively, with high MCP percentages of 80.0% and 91.7%, underscoring their collaborative research focus. These findings highlight China's dominant output in this field while also emphasizing the importance of international cooperation in advancing TCM-related dementia research.

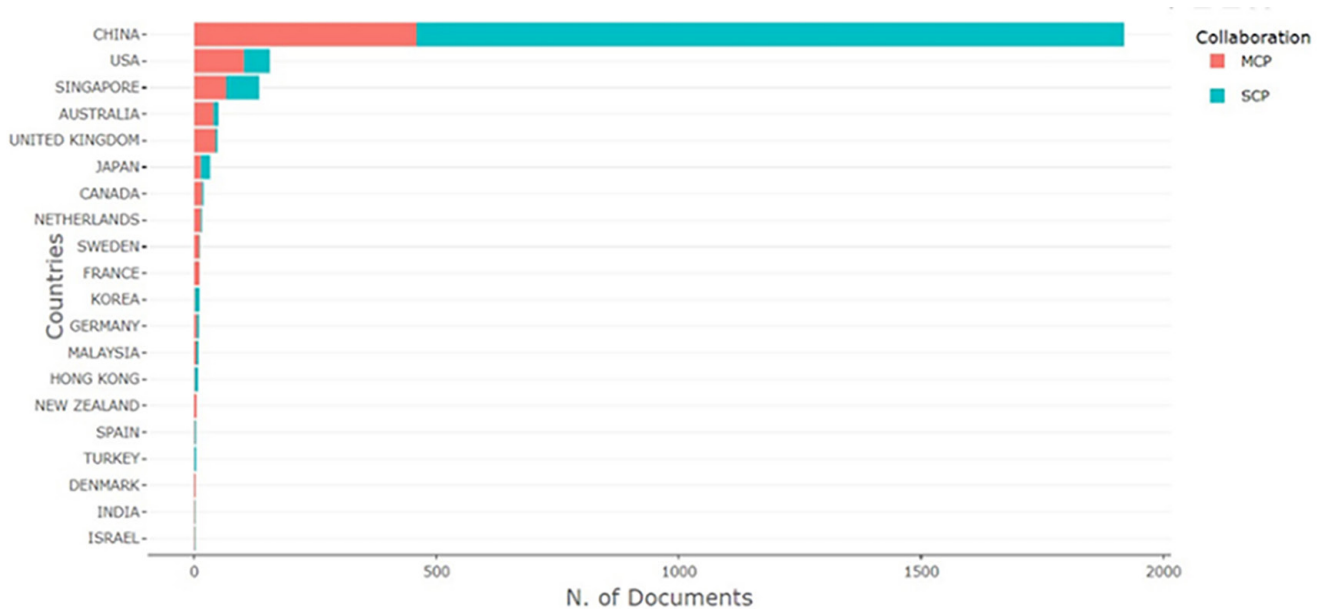


Fig. 3. Analysis of MCP and SCP by country

3.5 Analysis of GDP and research investment in papers on traditional Chinese medicine treatment for dementia

1. Analysis of GDP and national outputs in TCM treatment for dementia

Figure 4 illustrates the relationship between GDP and both citation counts and publication numbers in TCM-related dementia research. A strong linear correlation exists between GDP and total citations ($R^2 = 0.9161$), while the correlation with publication count is weaker ($R^2 = 0.3971$). The United States, despite not integrating TCM into its mainstream healthcare, leads in citations (47,199), benefiting from robust research infrastructure and interest in alternative medicine. China, as TCM's origin, follows with 37,789 citations, supported by government-led TCM modernization initiatives. The UK, though culturally distant from TCM, has also made significant contributions (6,749 citations). Other countries such as Singapore, Australia, Canada, Japan, and New Zealand show moderate influence, reflecting growing global engagement in this field.

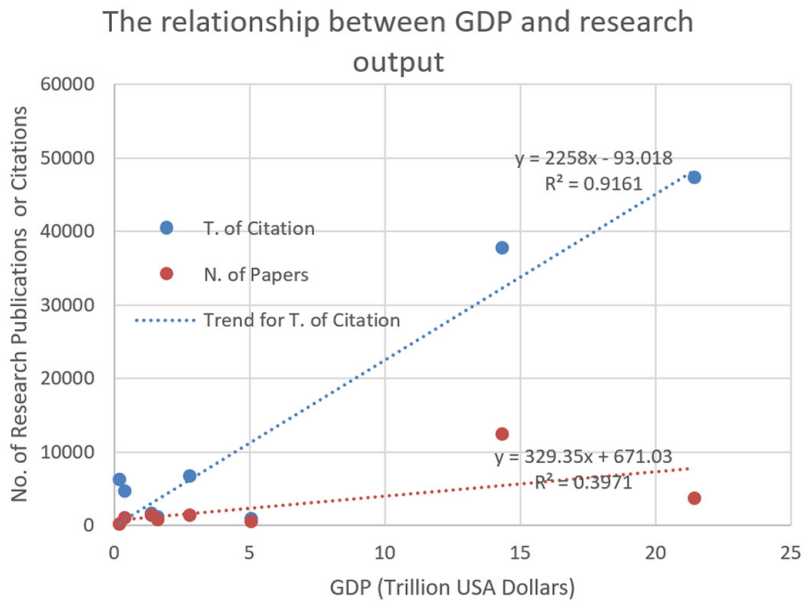


Fig. 4. Analysis of relationship between GDP and total citation count and number of papers of major publishing countries

2. Analysis of research investment/GDP and frequency of publication

Figure 5 explores how R&D investment relative to GDP correlates with publication output. Although the overall correlation is weak ($R^2 = 0.0414$), country-specific trends are noteworthy. The U.S. leads with an R&D/GDP ratio of 3.46% and 3,583 publications. China, with a ratio of 2.40%, produced 12,434 papers. Japan, Germany, and the UK also show high R&D investments and notable publication counts. Interestingly, Ethiopia published 503 papers despite a low R&D/GDP ratio (0.27%), suggesting strong research activity even in resource-limited settings. These findings reflect how economic capacity and research priorities shape global contributions to TCM-related dementia studies.

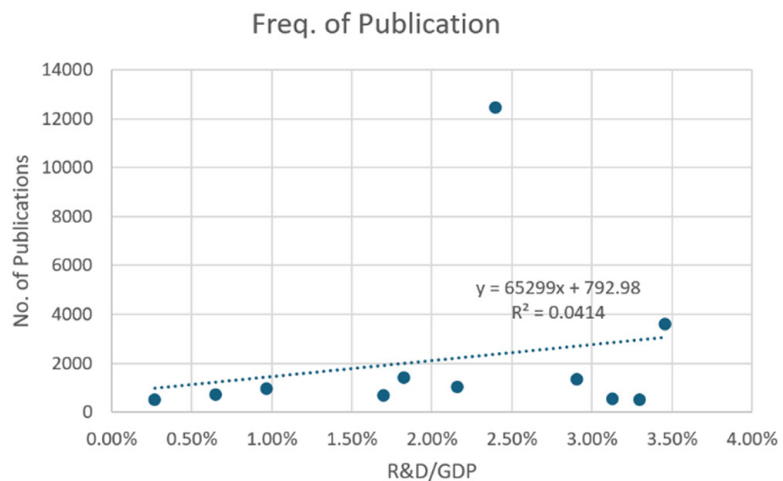


Fig. 5. The relationship between research and development (R&D) investment/GDP and frequency of publication

4 RESEARCH FIELD ANALYSIS AND PUBLICATION IMPACT OF TRADITIONAL CHINESE MEDICINE IN DEMENTIA TREATMENT

4.1 Impact of publications in leading journals and analysis of impact factors

Figure 6 highlights the importance of citation counts and journal IF in evaluating research quality and influence in the field of TCM for dementia. Notably, NEUROLOGY received around 4,131 citations (IF: 8.77), ALZHEIMERS DEMENT about 2,593 citations (IF: 17.127), J ALZHEIMERS DIS 3,568 citations (IF: 3.920), and BMC COMPLEMENT ALTERN MED 1,129 citations (IF: 2.833). These figures reflect the strong academic influence of these journals.

Generally, journals with higher IFs tend to have more publications and citations, underscoring their central role in dementia research. High-impact journals like NEUROLOGY and ALZHEIMERS DEMENT not only attract more articles but also amplify the visibility of research findings.

Overall, the data show a clear link between IF, citation volume, and publication frequency. Academic institutions publishing in these top-tier journals demonstrate leadership in the field. This analysis helps clarify current research trends and points to future directions in TCM-related dementia studies.

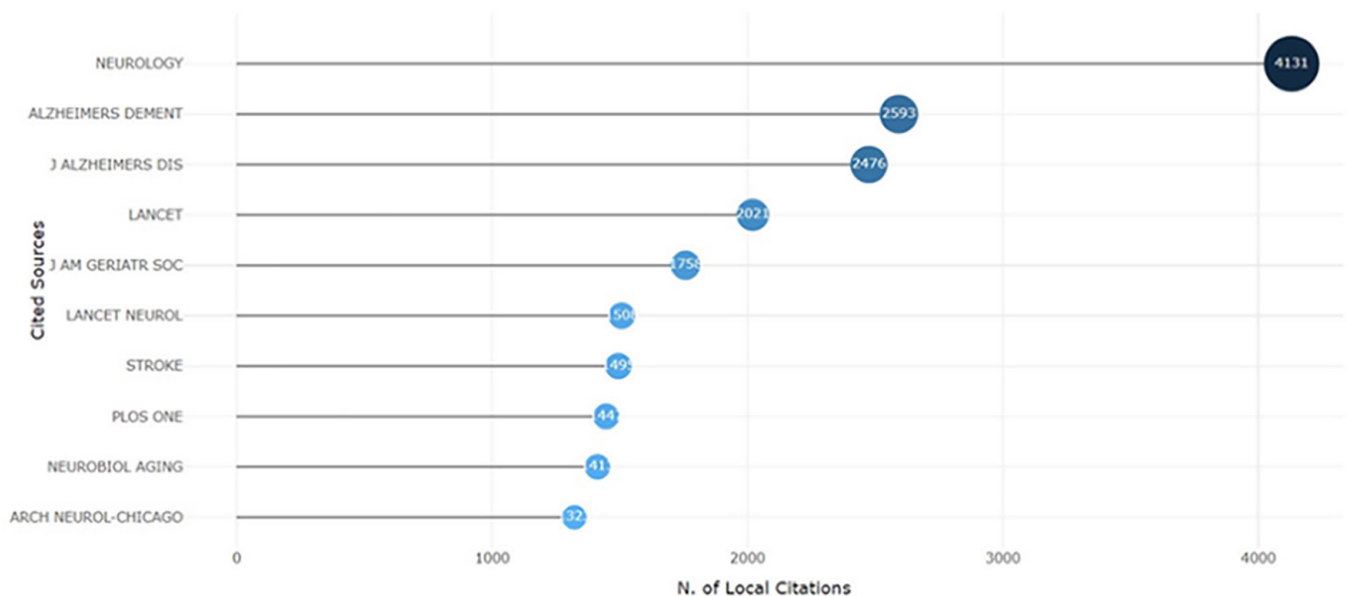


Fig. 6. Analysis of citation counts in relevant journals for publications on Traditional Chinese Medicine treatments for dementia

4.2 Analysis of publications by relevant research institutions

Figure 7 presents the publication output of leading academic institutions in the field of TCM for dementia. The Chinese University of Hong Kong leads with 751 publications, positioning itself as a key research center in Asia. Capital Medical University in China follows with 551 articles, reflecting its strengths in clinical and neurological research. Fudan University has contributed 521 publications, covering both basic science and clinical applications. The National University of



(c): Quadrant Distribution Diagram of Different Keywords

Fig. 8. Analysis results of keywords in Traditional Chinese Medicine treatment of dementia

- Disease classification: Keywords such as “dementia” (1,247 occurrences) and “Alzheimer’s-disease” (705) dominate, with growing attention to subtypes like “vascular dementia” and “small vessel disease,” reflecting a trend toward more specific disease categorization.
- Risk factors & epidemiology: Terms such as “risk,” “prevalence,” and “epidemiology” emphasize interest in understanding risk profiles and the potential of TCM in risk mitigation.
- Cognitive and behavioral focus: Frequent use of terms such as “mild cognitive impairment” and “cognitive decline” indicates a strong focus on cognitive outcomes, where TCM approaches aim to enhance memory and cognitive functions.
- Pathological mechanisms and biomarkers: Keywords like “oxidative stress,” “inflammation,” and “biomarkers” suggest interest in underlying mechanisms. Herbs such as Astragalus and Salvia miltiorrhiza are noted for their antioxidant and anti-inflammatory effects.
- TCM application and efficacy: The term “Chinese” (127 mentions) captures interest in clinical application, efficacy, and theoretical frameworks of TCM in treating dementia.
- Psychological health and quality of life: Terms such as “depression” and “quality-of-life” reflect a growing focus on emotional well-being, with several TCM formulas being explored for their mood-regulating effects and potential to improve life satisfaction among dementia patients. TCM formulas such as Chaihu Shugan San and Ganmai Dazao Tang are explored for mood enhancement.
- Research methods: Terms like “meta-analysis” and “validation” highlight efforts to ensure methodological rigor and scientific reliability in evaluating TCM interventions.
- Prevention and intervention: Keywords such as “prevention,” “intervention,” and “exercise” indicate an emphasis on early and non-pharmacological strategies, where TCM shows promise in enhancing elderly health and reducing dementia risk.

Overall, these keyword patterns reflect a comprehensive research landscape, addressing clinical, pathological, psychological, and preventive dimensions. This multidimensional approach provides valuable insights and guidance for future studies in TCM-based dementia treatment.

4.4 Analysis of important research literature

Figure 9 highlights key international publications, as of June 2024, that have significantly influenced the study of dementia and its connection to Chinese medicine. These highly cited papers, published in top journals such as *The Lancet* and *The New England Journal of Medicine*, cover major research themes with broad impact. Naghavi et al.'s 2015 *Lancet* study, cited 4,952 times, provides a comprehensive analysis of global dementia epidemiology, serving as a vital resource for health policy planning. James et al. (2018), also in *The Lancet* with 4,825 citations, assesses dementia's burden on global health systems, offering key insights for public health strategies. Roth et al. (2018), with 4,709 citations, explores the connection between cardiovascular health and dementia, emphasizing the role of chronic disease prevention. Afshin et al.'s 2017 study in *NEJM*, cited 4,140 times, examines the influence of diet on dementia, reinforcing the importance of nutrition in cognitive health.

These landmark studies provide critical foundations for understanding dementia's causes, risk factors, and prevention strategies. Their influence extends beyond academia, shaping clinical practices and informing public health policies worldwide.

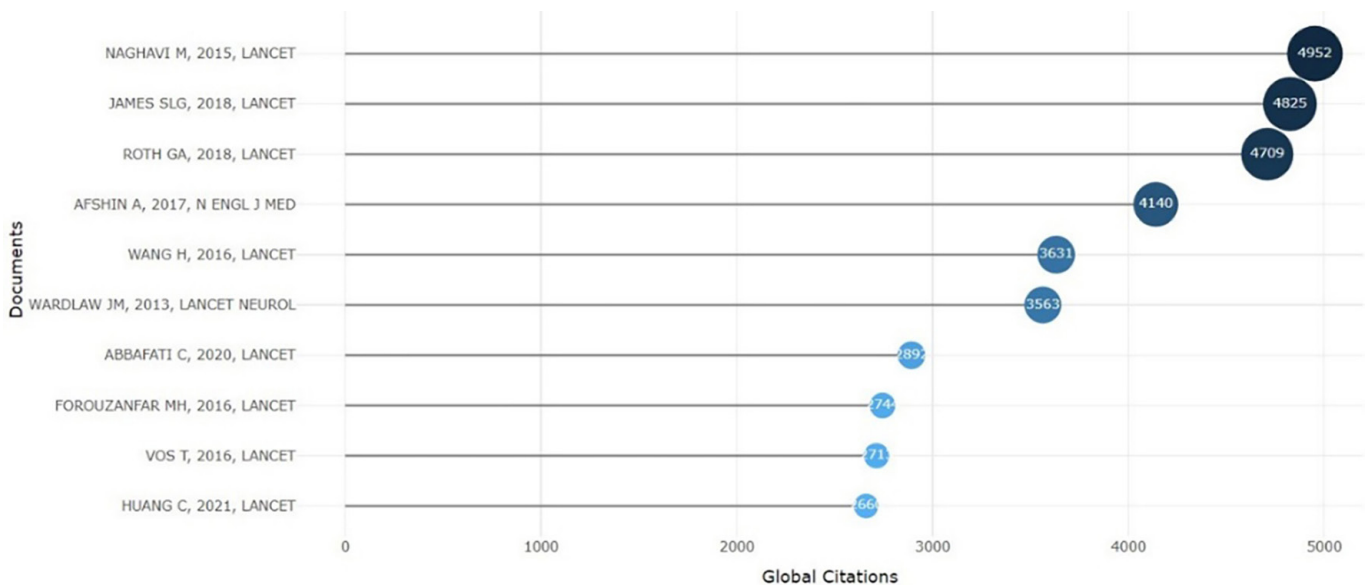


Fig. 9. Most cited global publications on Chinese medicine in treating dementia

Trends in research topics on TCM treatment of dementia. Figure 10 illustrates the evolution of research on TCM for dementia from 2004 to 2024, highlighting significant shifts in focus and methodology over the past two decades.

4.5 Past research development

- Early stage (2004–2010): Research focused on early diagnosis and basic biological mechanisms, including tools such as the structured clinical interview and biomarkers such as plasma homocysteine. These studies laid the groundwork for understanding dementia pathophysiology.
- Mid stage (2011–2015): The scope expanded to include genetic studies, nutritional risk factors, and pathology. Research began targeting specific populations, supporting the development of more personalized treatment strategies.
- Recent trends (2016–2023): Emphasis shifted toward public health, community-level influences, and holistic TCM interventions, reflecting growing interest in comprehensive, non-pharmacological approaches to dementia care.

4.6 Future research directions

- Integrated TCM approaches: Future work will explore combining herbal medicine, acupuncture, and massage for improved prevention and treatment outcomes.
- Biomarkers and mechanisms: Continued investigation into oxidative stress, inflammation, and gene expression aims to enable earlier diagnosis and more targeted therapies.
- Gut microbiota and lifestyle: Research will delve into the gut-brain axis and how TCM interventions can regulate gut microbiota to support cognitive health.
- Interdisciplinary collaboration: Broader collaboration across fields like genetics, neuroscience, and epidemiology—supported by large-scale clinical trials—will enhance the evidence base for TCM's role in dementia treatment.

Overall, TCM research for dementia has evolved from focusing on early diagnostics and biological mechanisms to emphasizing integrated interventions and public health strategies. These developments are laying a stronger theoretical and practical foundation for advancing clinical care and treatment innovation in this field.

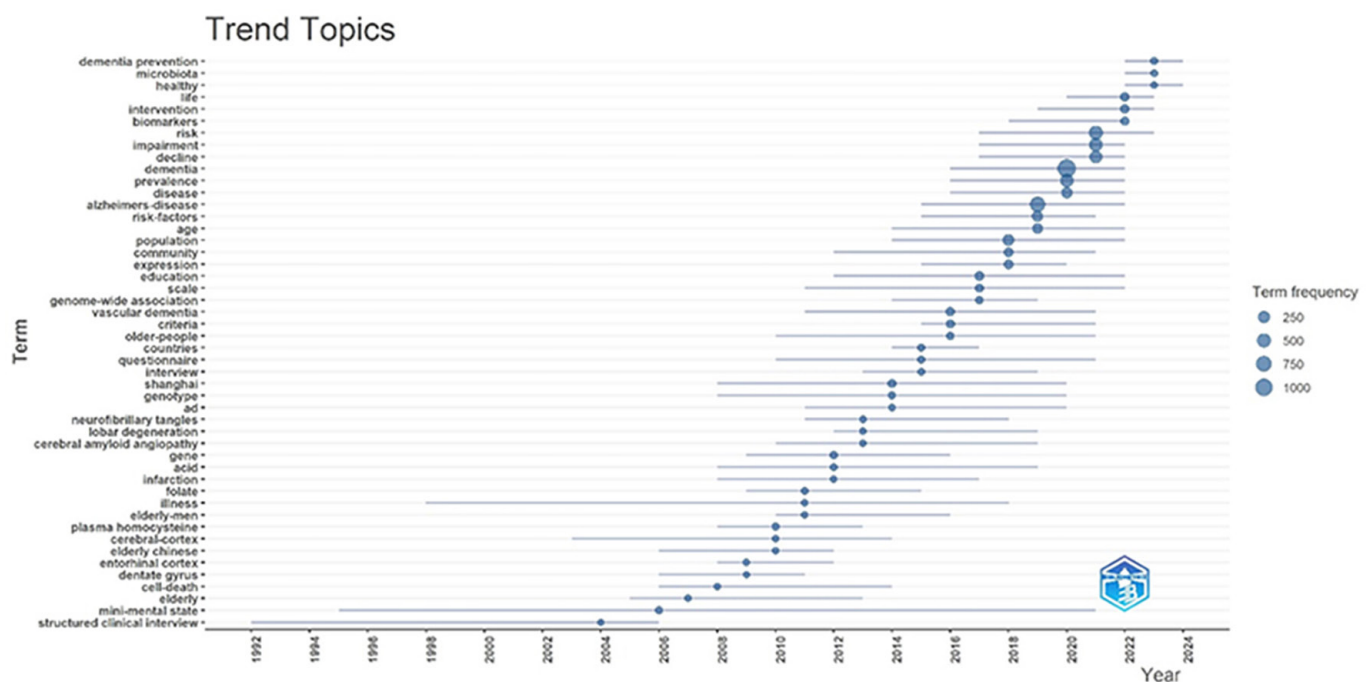


Fig. 10. Trends and changes in research topics on Traditional Chinese Medicine Treatment of dementia

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

This study analyzed 2,497 publications on TCM for dementia from 1991 to 2024 across 641 journals, with a 33.48% international collaboration rate and 81,362 cited references—indicating robust global academic activity. Key journals such as *Frontiers in Aging Neuroscience* and *Journal of Alzheimer's Disease* show both high output and influence, reflecting the interdisciplinary nature of this research field. Significant publication growth was observed in China, the USA, Singapore, the UK, and Australia, with varying levels of international collaboration—China leading in volume and partnerships. Citation-to-GDP analysis reveals that developed countries, especially the USA and China, dominate in both research output and academic impact.

5.2 Recommendations

- Increase research investment: As dementia becomes a global concern, investment in TCM as a complementary therapy is expected to grow, especially in aging societies.
- Promote interdisciplinary collaboration: Future research should integrate TCM with neuroscience, psychology, and biomedical sciences for more effective and holistic dementia treatment.
- Emphasize scientific validation: Large-scale clinical trials and long-term studies are essential to ensure the safety and efficacy of TCM in dementia care.
- Develop personalized treatments: Given dementia's complexity, personalized TCM approaches tailored to individual conditions will enhance treatment outcomes.

In summary, TCM research for dementia is expanding globally with increasing collaboration. In addition to scientific validation, establishing international TCM treatment guidelines for dementia and enhancing policy support can further bridge the gap between traditional knowledge and modern clinical practice.

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7 AUTHORS

Jinghui Sung is with the Fujian University of Traditional Chinese Medicine, Fuzhou, 350122, Fujian, China; Xiamen TCM Hospital Affiliated to Fujian University of Traditional Chinese Medicine, Xiamen, 361015, Fujian, China (E-mail: acyril0906@gmail.com).

Zikang Jiang is with the Fujian University of Traditional Chinese Medicine, Fuzhou, 350122, Fujian, China; Xiamen TCM Hospital Affiliated to Fujian University of Traditional Chinese Medicine, Xiamen, 361015, Fujian, China.

Yuanpeng Huang is with the Fujian University of Traditional Chinese Medicine, Fuzhou, 350122, Fujian, China; Xiamen TCM Hospital Affiliated to Fujian University of Traditional Chinese Medicine, Xiamen, 361015, Fujian, China (E-mail: huangyp998@xmu.edu.cn).