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Research Progress and Hotspot Analysis on Acupuncture and Moxibustion Treatment of Mild Cognitive Impairment

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Abstract: ***Objective:*** *Based on CiteSpace software, the literature on the treatment of mild cognitive impairment (MCI) by acupuncture in the past 20 years was analyzed, and the progress track and hot trends of acupuncture in the treatment of MCI were summarized.* ***Methods:*** *Chinese journal articles from January 1, 2004 to November 1, 2024 were retrieved from CNKI database and converted into CiteSpace software using Endnote X9 and Citespace6.3. R1 software analyzes keywords and draws knowledge map. The research progress and hotspot of acupuncture in the treatment of mild cognitive impairment were analyzed.* ***Results:*** *A total of 611 literatures were included, and it was found that the number of literatures on the treatment of MCI by acupuncture continued to increase in recent years, including acupuncture, electroacupuncture, clinical trials, etc.* ***Conclusion:*** *Visualization software was used to analyze the research hotspot of acupuncture in the treatment of mild cognitive impairment. Head electroacupuncture, RCT test, neuroprotection and repair of acupuncture, cognitive improvement, comprehensive treatment mode, prevention of dementia may be the research hotspot and trend in this field. In the past 20 years, the research on acupuncture in the treatment of mild cognitive impairment in Chinese literature has mainly focused on the observation of clinical efficacy and the exploration of mechanism of action. In addition, the clinical treatment methods of acupuncture and moxibustion are also continuously optimized, and the research on its mechanism of action is also continuously deepened. These trends reveal the potential and importance of acupuncture in the treatment of mild cognitive impairment.*

Keywords: Mild Cognitive Impairment, Acupuncture and moxibustion, Research progress, Hotspot analysis, Knowledge graph, Bibliometrics**.**

1. Introduction

With the gradual transformation of global population structure to an aging society, dementia has attracted increasing attention. Alzheimer's disease (AD) accounts for 60%-80% of all dementia types [1]. Mild cognitive impairment (MCI) is a transitional state from normal aging to Alzheimer's disease (AD), which is characterized by hidden onset, continuous progressive development, difficult early diagnosis, and a heavy burden on the family and society of patients. In 2024, China's latest expert consensus recommends that the state of progressive decline in memory or other cognitive functions, but does not affect the ability to live daily life, be called MCI [2]. It is reported that about 15% of patients with MCI develop AD each year, and the rate of conversion to AD within 3 to 4 years is as high as 50% [3]. In recent years, due to its high incidence, it has gradually become the focus of worldwide attention. Its pathogenic mechanism is complex, and A considerable part of the causes are still unclear. Currently, it is known that it may be related to the deposition of amyloid beta and abnormal tau protein [4]. The main therapeutic drugs in Western medicine include cholinesterase inhibitors, non-steroidal anti-inflammatory drugs, monoclonal antibodies against Aβ, neurotrophic agents, etc., in order to improve the blood supply to brain tissue and the metabolism of brain cells [5]. However, the adverse effects of these drugs are obvious [6]. Traditional Chinese medicine believes that the cause of MCI is weakness of the zang-fu organs (such as deficiency of kidney and Yin, deficiency of spleen and blood) [7], mainly caused by deficiency, phlegm turbidness and blood stasis [8], The main treatment of traditional Chinese medicine is through acupuncture, moxibustion, traditional Chinese medicine and other methods to regulate the brain network, so as to improve cognitive function [9]. According to relevant studies [10-11], acupuncture and moxibustion has significant effects on MCI, with various treatment points and few side effects. Although there are many relevant studies, they are usually presented in the form of reviews, and traditional literature analysis methods are difficult to fully show the research trend and disciplinary progress, and it is difficult to clearly show the evolution law of MCI. At present, most studies focus on the pathological mechanism and treatment combination of MCI, but the systematic summary and visual analysis of the research trends and hot spots of acupuncture treatment of MCI are still insufficient. In this study, CiteSpace tool was used to visually analyze the literature on acupuncture treatment of MCI in the past 20 years, revealing research trends and clinical models, and providing references for future research.

2. Literature Search

CNKI database was used to search Chinese journal articles on MCI with acupuncture from January 1, 2004 to November 1, 2024. Search word is "mild cognitive impairment" + "acupuncture", "mild cognitive impairment" + "needle", "mild cognitive impairment" + " moxibustion ", "mild cognitive impairment" + "electroacupuncture", with the application of Endnote X9, by checking and cleaning the retrieved literature, and screening out the lack of key information, conferences, non-medical research, and scientific research compilation literature. Using CiteSpace software, 611 valid papers were selected.

3. Research Methods

Using CiteSpace software, through keyword co-occurrence analysis, the knowledge map of acupuncture treatment MCI from 2004 to 2024 was drawn, and the research hotspots and development trends in different stages were revealed.

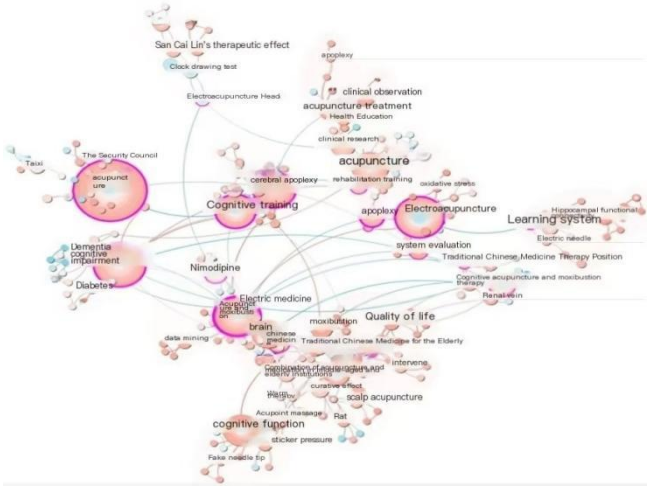

Figure 1: Co-occurrence analysis of key words in research literature on MCI in acupuncture treatment from 2004 to 2024

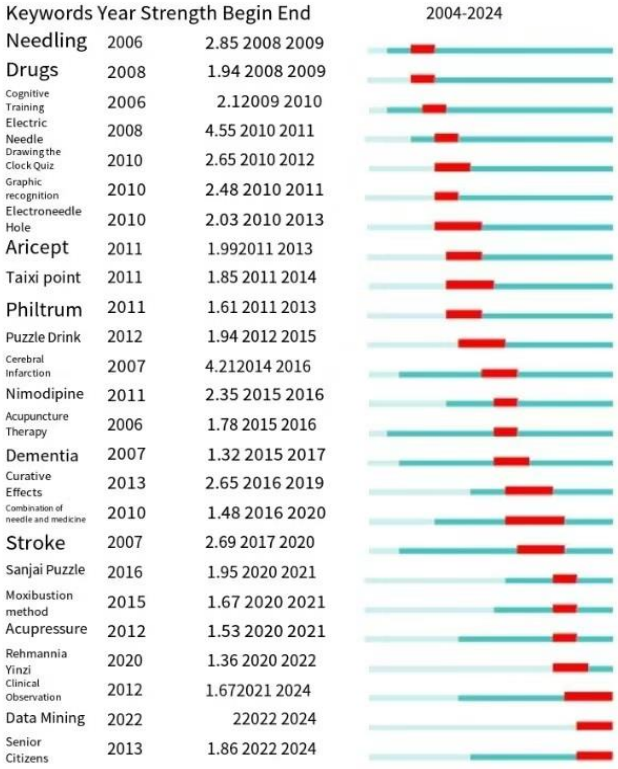

Figure 2: Key words emerging in the research literature on acupuncture treatment of MCI from 2004 to 2024

Note: Begin indicates the start time and End indicates the end time. Strength is the emergent strength, and the larger the value, the greater the strength

4. Research Results

4.1 Keyword Analysis

The treatment of MCI is generally divided into two parts: Western medicine treatment of MCI mainly focuses on drug treatment, but the effect of drug treatment has always been controversial, so in recent years, more and more attention has been paid to the non-drug treatment of MCI at home and abroad [12] traditional Chinese non-drug therapy - acupuncture has gradually appeared in everyone's vision. Acupuncture therapy has been widely studied and applied in the treatment of MCI. Relevant studies have shown that acupuncture is aimed at tonifying kidney, eliminating phlegm, promoting blood circulation, tonifying qi, improving nerve circuits and improving cognition [16]. For example, studies have found that "Jin San needle" therapy has good therapeutic effect and clinical applicability for MCI [17]. Resting state functional magnetic resonance imaging (rs-fMRI) also supports acupuncture as an effective treatment for MCI [18]. Other studies have found that acupuncture can improve cognitive function and cerebral blood flow in patients with MCI [10].

To sum up, a large number of relevant clinical RCT research trials are still needed to explore the effectiveness and feasibility of MCI TCM comprehensive intervention programs (combination of acupuncture and medicine, etc.), so as to provide more theoretical basis and evidence-based guidelines for the treatment practice of elderly MCI patients.

4.2 Outburst Word Analysis

A total of 25 burst words were generated, and the research hotspots in different stages were also presented. As can be seen from Figure 2, around 2008, "acupuncture", "drugs" and "cognitive training" have burst out, and after about 3 years of continuous upsurge, recent attention has declined. With the passage of time, the explosive words "electric needle point", "needle medicine" combination, moxibustion method began to appear. Among them, the treatment of head electroacupuncture is very popular, and the hot point of treatment is to increase the electrical stimulation of head points, promote the reconstruction of nerve function and improve the neuroplasticity of the brain, so as to improve cognitive function [19]. Neuroplasticity is the ability of the brain to reorganize and adapt after learning or new experiences [20]. Electrocephalic acupuncture can enhance connections and signal transmission between neurons, which helps to enhance cognitive function, improve the activity of brain functional networks, and delay the process of memory decline [21]. In recent years, "clinical observation" and "data mining" of acupoints have also begun to emerge. It can be seen that optimizing acupoint schemes and conducting a large number of clinical RCT tests are emerging hot directions in this field, so as to clarify the pathogenic law and provide evidence-based evidence for the further improvement and implementation of clinical treatment schemes.

4.3 Ending

From SCD (subjective cognitive decline) to MCI (mild cognitive impairment), patients often move towards dementia, with profound and heavy effects on individuals and families. The keyword "dementia" has appeared in 2007, and in recent years, the keyword "elderly" has broken out again, including the research on the causes of Alzheimer's disease, the improvement of treatment strategies and the evaluation of their effectiveness and safety [22]. In 2011, key words such as "Baihui point" and "Taixi point" appeared, and gradually paid attention to the intervention of acupoint optimization on patients' cognitive decline [23].

4.4 Research Hotspot and Trend Analysis

As can be seen from Figure 2, with the passage of time, interventions such as moxibustion, combination of acupuncture and medicine, and electroacupuncture (electroacupuncture point) have become important research hotspots and trends in this field in recent years.

4.4.1 Electroacupuncture treatment of head point

When acupuncture is applied to a specific point on the head and an electric needle machine is connected, the therapeutic effect can be improved. In a randomized controlled clinical trial with 252 participants, Zhang Hong et al [24] found that the electrocephalic acupuncture group had outstanding performance in improving cognitive ability. Kang Yingjie et al [25] found that electroacupuncture stimulation of Baihui point was also effective in the treatment of MCI, and could affect the local consistency of the brain. Li Yanhui et al [26] explored the mechanism of improving cognition with head electroacupuncture, believing that it could increase blood supply to the brain, stimulate the activity of antioxidant enzymes in brain tissue, and ultimately improve learning and memory.

4.4.2 Moxibustion method

Moxibustion method focuses on the moxibustion practitioner's technique, and the exploration of moxibustion therapy has become one of the hot research topics in the treatment of MCI in recent years. Its popular research direction focuses on the clinical efficacy and safety of "Sancai Yichi" moxibustion method. This moxibustion method is mainly applied at Baihui, Shenque and Yongquan acupoints to achieve the purpose of early intervention of MCI. Wang Haiyan et al [27] found that this therapy can not only significantly improve the cognitive function of patients, but also is easy to operate and has high safety. The effect of "three kinds of knowledge" moxibustion method may be related to its warm stimulation of the brain, which can promote local blood circulation and lymphatic circulation, strengthen the metabolic capacity of skin tissue, and contribute to the dissipation of pathological products. In addition, the heat, light and smoke properties of moxibustion are also believed to effectively improve the cognitive function of patients with MCI [28]. Zhang Hong et al [29] found through multi-center randomized controlled trials that the treatment of MCI patients with "Sancai Yizhi" moxibustion could improve the cognitive function scores of patients and shorten the latency of event-related potential P300, showing good efficacy and safety. In addition, moxibustion does not have as many side effects as drug treatment [30]. Although the current research has made some progress, the specific mechanism is still unknown, and further research is still needed. Some scholars have explored the brain effect mechanism of "Sancai Yichi" moxibustion intervention in MCI patients through studies based on resting state fMRI technology [31].

4.4.3 Combination of acupuncture and medicine

In recent years, the study of acupuncture combined with drugs in the treatment of MCI has attracted wide attention. This combined approach aims to enhance the patient's cognitive abilities through the interaction of the two treatments. According to relevant studies, the combination of acupuncture and medicine is more effective in improving the cognitive function of MCI patients than the use of western medicine alone [32]. The synergistic mechanism of this combination therapy lies in the synergistic effect of medicine and acupuncture. Drugs can enhance the effect of acupuncture, and acupuncture helps the absorption and utilization of drugs. Xu Qianqian et al. [33] found that the combination of acupuncture and Tianzhi granules could significantly improve the cognitive function of patients with MCI. The combination of acupuncture and medication offers a new treatment option for patients with MCI, showing better efficacy than traditional monotherapy.

4.4.4 Aricept

As can be seen from Figure 2, the core keyword "Aricept" (Donepezil hydrochloride), because there are quite a few clinical randomized controlled trials surrounding the efficacy of acupuncture and Donepezil hydrochloride. For example, in the study conducted by Chen Jian et al [31], Donepezil was taken in the control group and acupuncture was added to the treatment group. The study found that acupuncture combined with Donepezil hydrochloride had a better effect on MCI than Donepezil hydrochloride alone. According to relevant studies, Donepezil hydrochloride, as a commonly used cholinesterase inhibitor, is mainly used to improve the cognitive ability of patients. In recent years, new dosage forms such as nano-microtablets have also appeared [32]. The mechanism of nootropics and antioxidants is to improve the metabolic and antioxidant capacity of the brain, which can only delay the decline of cognitive function [33]. In recent years, therapeutic drugs targeting MCI have been continuously developed. Newer drugs, such as Lecanemab and Donanemab, have shown some success in clinical trials in slowing cognitive decline in patients with early, symptomatic dementia [5]. Because no specific drug for MCI has been developed so far, and existing drugs have obvious side effects [6], people are eager to find more effective treatment measures with less adverse reactions, so acupuncture has received special attention.

5. Summary

The research of acupuncture in the treatment of MCI is growing. Through the analysis of key words, we found that the research focus on the treatment of MCI. These studies have deepened since the early days, and new research points continue to emerge, injecting new momentum into the field. Although numerous studies have been conducted on the treatment of MCI by acupuncture, more comprehensive RCT trials are needed to support efficacy and provide evidence for evidence-based studies that focus on both specific details and overall analysis. In addition, each stage has its own research focus, such as "acupuncture and medicine combination", "head electroacupuncture", "moxibustion" and "clinical observation", which greatly promoted the development of various disciplines. Limitations of this study include the exclusion of some literatures due to incomplete information, limited Citespace transcoding, and limited analysis to Chinese literatures, which may limit the comprehensiveness of the study. To sum up, the research of acupuncture treatment of

MCI is gradually deepening, but there are still some problems to be solved to promote the further development of this field, and the future related research may be more reflected in the clinical observation and the mechanism of acupuncture point action.

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