

Analysis of research hotspots in the field of acupuncture for the treatment of post-stroke shoulder-hand syndrome

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Abstract: By searching the literature related to acupuncture treatment of post-stroke shoulder-hand syndrome from the establishment of China Knowledge Network database to February 1, 2023, the research hotspots such as authors, research institutions and keywords of related literature were analyzed. A total of 824 articles that met the criteria were included, with a fluctuating upward trend in the number of articles published annually; the most frequent authors were Zhuang Lixing and Han Shukai; Guangzhou University of Traditional Chinese Medicine and Heilongjiang University of Traditional Chinese Medicine were the main research institutions; electroacupuncture and acupoint injection were commonly used in the treatment of post-stroke SHS by acupuncture, and the acupoints chosen were "shoulder three needles". The acupoints used are "shoulder three needles", "contracture three needles", Waiguan point and Renying point; the current research hotspot is the clinical observation of acupuncture treatment of post-stroke SHS, and there is a lack of high-quality experimental research, so in the future, the research teams need to strengthen the efficient synergy, connect the various opportunities for cooperation, and deepen the inter-regional cooperation.

1. Introduction

Shoulder-hand syndrome, also known as reflex sympathetic dystrophy, is one of the common post-stroke complications, often occurring within one to three months after stroke. It is a syndrome with the main clinical manifestations of pain, edema, and sensory abnormalities in the joints of the shoulder, hand, and wrist with limited joint movement in the early stage, and obvious atrophy of the skin and muscles with impaired movement in the later stage[1]. The Su Wen - impotence theory "said" Yang Ming, the five viscera and six bowels of the sea, the main Run Zong tendon, Zong tendon main bundle of bones and organs ", the joints of the limbs of the function of activity depends on the constraints and support of the meridian, if the Yang Ming meridian is not in tune with the meridian, the meridian is out of order and the limbs to the activity is not favorable. And lung, small intestine, Sanjiao and other meridians are circulating in the upper limbs, "the meridians over, the main treatment of the", acupuncture points to the proximal selection of points and the distal selection of a combination of points, so as to regulate the qi and blood, dredge the meridians and channels to alleviate pain, blood circulation, and improve the function of the affected limbs.

Studies have shown that in recent years, the incidence of post-stroke SHS patients has been

increasing year by year, even up to 70% [2], which seriously affects the rehabilitation treatment and quality of daily life of post-stroke patients, and is not conducive to the return of patients to their families and society. At present, drugs, surgery and rehabilitation are the main treatments for this disease, but the therapeutic effect is unsatisfactory and more adverse reactions and traumatic [3]. Acupuncture, however, can effectively circumvent these shortcomings due to its simple operation, low adverse effects and easy acceptance by patients, and has been widely used in clinical practice. In recent years, the advantages of acupuncture in the treatment of SHS in stroke have been highlighted, and studies have shown that acupuncture or acupuncture combined with other therapies have good efficacy in the treatment of SHS after stroke in clinical practice [4]. At present, there is a wealth of research in this field, and a large amount of literature has been accumulated, and there is an urgent need to carry out a scientific and comprehensive systematic generalization and combing of the existing literature and data.

2. Information and methodology

2.1 Source

The China Knowledge Network database was used as the source of data and information to search the literature related to acupuncture for the treatment of SHS after stroke. The search strategy was (subject = "acupuncture" OR "acupuncture" OR "electroacupuncture" OR "needle" OR "Auricular points" OR "Ear acupuncture" OR "Acupuncture" OR "Stabbing" OR "Fire acupuncture" AND "Stroke" OR "Stroke" OR "Stroke" OR "Ischemic stroke" OR "hemorrhagic stroke" OR "cerebral infarction" AND "shoulder-hand syndrome" OR "SHS"). The search period was from the time of the Knowledge Network's establishment to February 2023.

2.2 Inclusion and exclusion criteria

Inclusion criteria: ① Clinical studies and experimental studies on acupuncture treatment of post-stroke SHS and other related Chinese literature; ② The study subjects were post-stroke SHS and its related diseases; ③ The treatment method was based on acupuncture, which could be combined with other therapies.

Exclusion criteria: ① literature with incomplete information such as articles, authors, years, etc.; ② duplicate published literature; ③ scientific and technological achievements, conference notices, news reports, guidelines and other irrelevant literature.

3. Results and analysis

As of February 2023, a total of 1,159 relevant papers were retrieved and a total of 824 papers were finally included, all of which met the requirements of this study.

3.1 Analysis of the annual volume of publications

The annual trend graph of the number of publications can be a good reflection of the degree of research progress, development and interest in this research area in a certain period of time. As seen in Figure 1, the number of publications shows an increasing trend of $y = 2.7096x - 5420.2$ with $R^2 = 0.6637$, (the closer R^2 is to 0.8, the higher the goodness-of-fit of the model, which reflects the trend of literature development in the field well) [5]. Overall, the number of articles published has been increasing, which is in line with the linear growth trend. The earliest published articles were retrieved in 1995, 1995-2006 belonged to the stage of research and exploration, and the annual

number of articles was only 1.7 and most of them were clinical observations and summaries of experience. 2007 to now has shown a significant growth trend, with the number of articles increasing year by year, and the number of articles published in 2020 was even as high as 79, and the figure shows that only 3 articles were published in 2023, and the number of articles published in 2020 is decreasing. In 2023, only 3 articles were published, showing a decreasing trend. At this stage, more scholars have conducted research and published characteristic acupuncture therapies for the treatment of this disease, which provide many ideas and methods for the clinic, indicating that this field has been paid attention to and has a certain research scale and breakthrough progress.

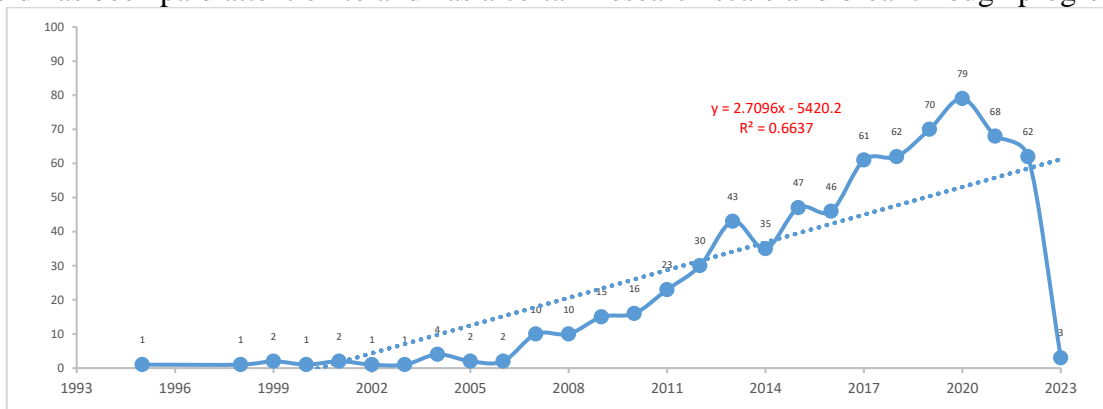


Figure 1: Trends in the number of posts on acupuncture for shoulder-hand syndrome after stroke

3.2 Authors' analysis

Analyzing the cooperation of authors in related literature, the author with the most publications is Zhuang Lixing (8 articles), and the total number of authors with ≥ 4 publications is 14, and the top ten authors can be seen in Table 1. At present, Han Shukai's team, Cui Shaoyang's team, and An Ping's team all belong to the early research teams in this field, while Qiu Zhixin's team and Zhen Yuting's team are the research teams in this field in recent years.

Table 1: Top 10 authors in terms of publications

No.	Volume of literature (articles)	particular year	author
1	8	2010	Zhuang Lixing
2	7	2011	Han Shukai
3	6	2011	Cui Shaoyang
4	5	2011	Cao Wenjie
5	4	2011	Anping
6	4	2011	Xu Xiuhong
7	4	2011	Liu Yue
8	4	2009	Liu Weiai
9	4	2011	Wu Yuhua
10	4	2012	Sun Zhiying

3.3 Analysis of institutional cooperation

Institutional cooperation in the relevant literature was analyzed, of which 6 institutions issued ≥ 10 articles (see Table 2), with Guangzhou University of Traditional Chinese Medicine (49 articles) as the representative of the research institution, absorbing multiple institutions and collaborating with each other within the team, but failing to collaborate effectively with other research teams. At

present, the institutions are mostly decentralized, and cooperation is mostly affiliation, mainly between various TCM universities and their affiliated hospitals, such as Tianjin University of Traditional Chinese Medicine and Heilongjiang University of Traditional Chinese Medicine. There are also many institutions that conduct independent research and lack research teams, such as the Hunan University of Traditional Chinese Medicine. There is also cooperation between a few institutions across regions, because of some factors such as geographic location and different academic schools, there is less contact between different provinces, which is not conducive to the development of research and will produce more geographical limitations. In the future, all institutions should strengthen efficient synergy, articulate various opportunities for cooperation, and join efforts to deepen cross-regional cooperation, so as to enhance and optimize the space for development.

Table 2: Number of publications by research institutions

No.	Number of publications (articles)	particular year	Institution
1	49	2008	Guangzhou University of Chinese Medicine
2	33	2005	Heilongjiang University of Chinese Medicine
3	20	2008	Liaoning University of Chinese Medicine
4	15	2007	Tianjin University of Chinese Medicine
5	13	2008	The First Affiliated Hospital of Tianjin University of Traditional Chinese Medicine
6	10	2014	Anhui University of Chinese Medicine
7	9	2006	Hunan University of Chinese Medicine
8	9	2009	The Second Affiliated Hospital of Heilongjiang University of Traditional Chinese Medicine
9	7	2004	Nanjing University of Chinese Medicine
10	7	2009	Beijing University of Chinese Medicine

3.4 Keyword Analysis

Keywords are the core summary of the study, is the word of the whole text content of the refined summary, high-frequency keywords can reflect the research hotspots in this field, the analysis of keywords can reflect the research focus and hotspots in this field. The keywords of the related literature were analyzed, and acupuncture therapy as a keyword with a high frequency of occurrence and a centrality of 0.44 represents an important impact in the field and a high level of scholarly attention. After summarizing the keywords, it was found that the current treatments were mainly acupuncture therapy, tuina therapy, rehabilitation therapy, and herbal infusion therapy; acupuncture treatments included warm acupuncture, acupoint injection, electroacupuncture, eye acupuncture, floating acupuncture, fire acupuncture, and milli-fire acupuncture; the symptom that appeared with the highest frequency was pain; the type of study was based on clinical observation and review; the needles involved were the shoulder triple needles; and the measurements were motor function and quality of life. The keywords were further analyzed by clustering, and 11 clusters with representative meanings were generated. They were #0 acupoint injection, #1 acupuncture, #2 herbal infusion, #3 electroacupuncture, #4 acupuncture, #5 rehabilitation training, #6 post-stroke, #7 cerebral infarction, #8 acupuncture therapy, #9 warm acupuncture, and #10 chi-feng ying-yuan. Clusters #0, #1, #2, #3, #4, #5, #8, and #9 belong to acupuncture combined with other therapies, which contains the most clusters, indicating that acupuncture therapy is the

mainstay of treatment for post-stroke shoulder-hand syndrome; #6 and #7 belong to a class of clinical syndromes; and #10 belongs to a type of compound acupuncture maneuver.

4. Discussions

Stroke is a disease with high morbidity and mortality, and its complications threaten people's health and bring serious disease burden. SHS is a common complication after stroke, causing severe pain in the injured area and affecting the functional movement of the limbs. In Chinese medicine, SHS belongs to the category of "paralysis"[6]. Its main pathogenesis is stagnation of qi and blood stasis, deficiency of qi, blood and fluid, muscle loss of moistening, "not through the pain", "not glorify the pain", so the cost of the disease. Therefore, the principle of treatment is to benefit qi and activate blood circulation, and to clear the channels and relieve pain. Acupuncture is an effective intervention for the treatment of post-stroke SHS, and it can relieve pain and improve limb motor function by following the meridian dialectic in a timely manner[7]. The research related to the treatment of post-stroke SHS with acupuncture has been deepening, and further research is needed to deepen it.

By focusing on the evolution of the ins and outs of a field of knowledge and analyzing it with the help of charts and graphs, it is more intuitive and in line with the public's cognition, which can better reflect the characteristics of the field, and this approach has gained the favor and attention of more researchers. The present study summarizes and analyzes the annual publication volume, authors' cooperation, research institutions, and keywords of the literature related to acupuncture treatment of post-stroke shoulder-hand syndrome, so as to summarize the research hotspots and research trends in this field and provide theoretical guidance for the development of the discipline of acupuncture treatment of post-stroke shoulder-hand syndrome.

There is a fluctuating and increasing trend in the number of publications related to acupuncture treatment of SHS after stroke. In the 1980s, this field initially attracted the attention of researchers, and due to the influence of geography, education, cultural dissemination, and economic factors, the number of annual publications was very small and the content of the research was relatively homogeneous. Until 2007 to the present rapid development, and in 2020 the number of articles reached its peak, then the number of articles began to decline but still at a high level, indicating that the field is still a hot research, and social attention is high.

Han Shukai's team was the early research team to carry out the experimental study, and the article is based on clinical observation. Based on the holistic concept of Chinese medicine and meridian theory, the team explored the efficacy of combining acupuncture and medicine in treating spasticity, pain and edema associated with post-stroke SHS, long-term efficacy, patients' depression, limb motor function and quality of life. The team formulated a formula for tonifying qi, resolving phlegm and clearing collaterals [8]. Nourishing qi and activating blood, moving qi and resolving phlegm to pass through the channels, together playing the function of adjusting yin and yang. At the same time, using the method of stabbing the surface and inner meridians together, five acupoints were selected to adjust the deficiency and balance the yin and yang. Cui Shaoyang's team is the largest team in the early stage of the study, with close cooperation within the team and rich research content, mainly focusing on the efficacy of different acupuncture methods on SHS after stroke. For example, exploring the shoulder three needles of Jin three needles to relieve pain and restore the functional activities of the limbs[9]; red phoenix welcome source needle method to increase the feeling of needles, prompting the qi to the place of disease; bee needle therapy direct stabbing acupuncture points to regulate the operation of qi and blood, while its bee venom plays a role in reducing oedema, analgesic and anti-inflammatory effects [10]. The team represented by Yuting Zhen studied the clinical efficacy of warm acupuncture combined with traditional Chinese medicine

and stabbing and bloodletting combined with traditional Chinese medicine. This team has fewer publications and is an emerging research team in recent years. The emerging research team represented by Zhuang Lixing, which has a large number of publications, mainly studies the clinical efficacy of temporal three needles, shoulder three needles and contracture three needles of Jin three needles.

The research team of Guangzhou University of Traditional Chinese Medicine is more influential and has the largest number of publications. The research therapies are varied, including acupoint plastering, Ribbon-Tui Na, Qihuang acupuncture, abdominal acupuncture, blood-stabbing therapy, stagnant needle technique, and acupoint embedding. Heilongjiang University of Traditional Chinese Medicine mainly researched different stabbing methods, such as cephalic point clustering, penetrating stabbing method, Baihu shaking head acupuncture, Qi stabbing method, meridian cranial repetitive acupuncture, and following the meridian and far fetching and moving method. Cross-regional cooperation exists between Liaoning University of Chinese Medicine and Beijing University of Chinese Medicine, but the collaboration is not close enough to become an influential team. Teams are common carriers of knowledge, and it is suggested that in the future, we should emphasize and develop team knowledge resources, strengthen team construction, and promote the teams of each geographical region to a high level and quality.

The "shoulder three needles", "contracture three needles", Waiguan point and Renying point are the commonly used acupuncture points for the treatment of post-stroke SHS. The shoulder three needles consist of the shoulder point of the Large Intestine meridian and the anterior and posterior shoulder points of the Qi meridian. The "three needles for contracture" of the upper limbs include Jiequan, Shakuzawa, and Neiguan. Wai Guan point for the hand Shaoyang San Jiao meridian points, local points can dredge the local qi and blood, the meridian over the main treatment, so Wai Guan can treat the arm, finger flexion and extension of unfavorable and impotent paralysis of the upper limbs. It is also one of the eight chakra convergence points, which can be used to calm the wind and activate the meridians and collaterals. Treatment of the elbow and arm can not be flexed and extended, five fingers can not hold and other diseases. People meet the point belongs to the foot yangming stomach meridian, more gas and blood, so it can adjust the balance of qi and blood, through the meridians and activate collaterals. Acupoints are both the reaction point of the disease and the stimulation point of the treatment, and the flexible application of acupoints for rational allocation is the premise of acupuncture treatment. The location variation, functional role, point matching, depth of needling and different techniques of acupuncture points may be the future research direction of acupuncture treatment for post-stroke SHS. The acupuncture technique of Red Phoenix Ying Yuan deserves our attention as a compound tonic and diarrhea technique, named because its operation resembles a phoenix spreading its wings and flying in a circle. This technique is used for the hand to promote qi, move qi, enhance needle sensation to maintain acupuncture induction, and dredge qi and blood in the meridians.

Electroacupuncture therapy is a method of treating diseases by connecting an electroacupuncture instrument after millimeters needling and acting on the human body through the pulsed current output from the electroacupuncture instrument. Electroacupuncture therapy can improve the effect of needling and has significant analgesic effect. (Song Yixuan, 2019) et al[11] randomly divided 196 patients with post-stroke shoulder-hand syndrome into 2 groups, 98 cases in the control group were given tui na rehabilitation training, and 98 cases in the treatment group were treated with electro-acupuncture combined with tui na rehabilitation training, and the acupoints taken were: the healthy side of the foot Sanli, hanging bell, the hand Sanli, the Quchi, the Wai Guan, the Nei Guan, the Shoulder Sacrum, the Shoulder, the Shoulder, the Sanyinjiao, and the Shoulder Front acupoints. RESULTS: The total effective rate was 91.8% in the treatment group and 62.2% in the control group, and the efficacy of the treatment group was better than that of the control group ($P < 0.05$);

the pain VAS, the swelling degree score, the serum calcitonin gene-related peptide (CGRP) content, and the serum substance P (SP) content of the treatment group were lower than that of the control group after treatment ($P < 0.05$). Acupuncture point buried thread through the buried thread needle to absorbable thread body buried into the acupoints, through the process of absorption of the thread body in the body constantly produce stimulation in order to prolong the time of the acupuncture effect so as to improve the clinical efficacy. (Xing Bingfeng, 2019) et al [12] randomly divided 60 cases of post-stroke shoulder-hand syndrome patients into 2 groups results: the total effective rate of the treatment group after the end of treatment 93.33%, the total effective rate of 1 month after the end of treatment 86.67%, the total effective rate of the control group after the end of treatment 73.33%, the total effective rate of 1 month after the end of treatment 73.33%, the therapeutic effect of the treatment group is better than that of the control group ($P < 0.05$). Cupping therapy utilizes the negative pressure inside the can to make the local skin congested and achieve the effect of regulating the yin and yang of the internal organs. Through cupping, the local blood flow can be improved and the meridians and collaterals can be opened up. Cupping on the affected limbs and back, according to the first up and then down, first yin and then yang for walking cupping, cupping in the Quchi, shoulder, Hegu and other acupuncture points, the clinical symptoms improve significantly, with analgesia, reduce swelling, improve motor function of the affected limbs, improve the role of muscle strength. Acupuncture point injection therapy injects medication into the body's acupoints, playing the dual role of acupuncture and medication to improve clinical efficacy, and can stimulate the acupoints to play a role in relieving menstruation and pain. Acupuncture treatment plays an important role in improving clinical symptoms, promoting recovery of nerve function, improving joint mobility, enhancing motor function of the affected limbs, and preventing further progression of the disease.

5. Conclusions

Acupuncture treatment for post-stroke SHS has been widely used in clinical practice, which has the characteristics of easy operation, little adverse effects and easy acceptance by patients. However, there are some problems. This study is mostly a clinical observation and lacks high-quality basic research, and the mechanism of acupuncture has not yet been clarified. Although the efficacy of acupuncture in the treatment of post-stroke SHS is remarkable, and the combination of multiple therapies can improve the possibility of patient recovery, the treatment protocols vary due to the combination of acupoints, depth of acupuncture, different techniques and amount of stimulation, etc. It is recommended that scholars and teams from different regions should work together to improve the effectiveness of acupuncture in the treatment of post-stroke SHS. It is recommended that scholars and teams from different regions should not only strengthen communication and cooperation, share and discuss clinical experiences, but also analyze specific problems and flexibly identify patients with different conditions. The shortcomings of this study: only the Chinese literature in the Zhi.com database was combined and analyzed, and other databases and English literature were not involved, so the results have certain limitations.

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