



Data Analysis of Acupoint Selection in Acupuncture Treatment for Post-Stroke Depression Based on Traditional Chinese Medicine Inheritance Support System (TCMISS)

Pornfah Ananpaisarn^{1*} and Titi Phanjaroen²

¹ The center of Thai Traditional and Complementary Medicine (TTCM), Center for Medical Excellence(Cmex), Faculty of Medicine, Chiang Mai University , Chiang Mai 50200, Thailand

² Department of Traditional Chinese Medicine, School of Integrative Medicine, Mae Fah Luang University, Chiang Rai 57100, Thailand

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***Conference presenter and corresponding author:**

Pornfah Ananpaisarn, The center of Thai Traditional and Complementary Medicine(TTCM), Center for Medical Excellence(Cmex), Faculty of Medicine, Chiang Mai University, Thailand

E-mail:

fah_tianmi@hotmail.com
(Pornfah Ananpaisarn)

Titi.Pha@mfu.ac.th
(Titi Phanjaroen)

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ABSTRACT

Introduction: Post-Stroke Depression (PSD) is the one of the most common clinical complications in stroke patients. There are currently many methods of treatment for this disease, for Traditional Chinese Medicine acupuncture will be used mainly because it is safe, effective and few side effects.

Objective: To summarize the rule of acupoint selection in acupuncture treatment of post-stroke depression based on data mining of clinical literature papers by Traditional Chinese Medicine Inheritance Support System (TCMISS) to provide new insights in clinical therapy.

Methods: The clinical research literature on acupuncture treatment of post-stroke depression was collected from the CNKI, Weipu and Wangfang Journal database between May 2012 to April 2022. The acupoint prescription was entered into the “Traditional Chinese Medicine Inheritance Support System (V2.5) software” and were analyzed for frequency, repetitive and core combination of prescribed acupoints.

Results: 85 articles, 85 acupoint prescriptions and 79 acupuncture points were included into the study. The acupoints with highest frequency in overall usage in descending order are Baihui (DU20), Taichong (LR3), Neiguan (PC6), Shenmen (HT7) and Sishenchong (EX-HN1). The high-frequency acupoints combinations are listed as follows: Baihui (DU20) and Neiguan (PC6), Baihui (DU20) and Taichong (LR3), Baihui (DU20) and Shenmen (HT7).

Conclusion: Data mining and analysis of acupoint selection in acupuncture treatment of post-stroke depression could provide a new idea and insight for further clinical treatment.

Keywords: Post-stroke depression; Acupuncture; Acupoint selection; TCMISS

Introduction

Post-Stroke Depression (PSD) is a secondary depression that occurs after stroke and is the one of the most common clinical complications in stroke patients. The main features are depression, slow thinking, disturbance of thinking content and reduced conscious activities, even some patients have behaviors such as world-weariness and suicide, which affect the recovery of patients [1]. The incidence of PSD is 30% to 50% [2]. As for the treatment of this disease, western medicine mostly uses antidepressant drugs for antagonistic treatment. These drugs have achieved certain effects,

but there are also different degrees of adverse reactions, which are easy to cause allergic reactions and the formation of dependence, resulting in poor patient compliance, thereby affecting patient treatment [3]. Traditional Chinese medicine is mainly based on prescriptions and acupuncture in the treatment methods, and its clinical application has the advantages of obvious curative effect, high safety and less side effects. Relevant studies have shown that acupuncture to stimulate the cerebral cortex can effectively increase the content of NE, 5-HT and DA in the blood, and at the same time can inhibit the hypothalamus-pituitary-

adrenal cortex axis, improve and effectively inhibit nerve cell apoptosis, thereby improving PSD symptoms and restoring neurons damage [4]. In this paper, with the aid of Traditional Chinese Medicine Inheritance Support System (V2.5), the data mining method will be used to explore the selection rules of acupuncture points for post-stroke depression, provide reference and inspiration for clinical treatment based on data correlation.

Methodology

Research literature selection

Searched in CNKI, Weipu, Wangfang and selected related documents in the database between May 2012 to April 2022.

a. Inclusion criteria : Clinical treatment of acupuncture for PSD published in domestic journals, Observation; Diagnosis of PSD; Acupuncture treatment the main treatment is effective; Use of Chinese or internationally recognized diagnostic and efficacy evaluation standards
b. Exclusion criteria : Non-clinical research literature such as animal experiments, literature reviews, experience summaries; Issuing other diseases after stroke such as constipation and dizziness; Conference papers, Master's and Doctoral thesis ; Documents using non-traditional acupuncture, such as acupoint injection, scalp acupuncture, electronics, floating needles; case report; Repeated publications.

Retrieval strategy

Use " Post- Stroke Depression AND acupuncture" as the key word for the search

Terminology specification

Use "The Name of Acupoint" and "Positioning" "standardizes the acupuncture point names to classical names", If you find the acupoint name "Shuigou (GV26)" and "Renzhong (GV26)" record as "Renzhong (GV26)"

Statistical processing

Use the data analysis "Frequency statistics" tools in TCMISS function. The frequency of usage of different acupuncture points were analysed. Acupoint frequency was sorted from high to low. These were based on association rules that were applied to the "composition formula" for the analysis of the compatibility of each acupuncture points. See figure 1, figure 2.



Figure 1 Traditional Chinese Medicine Inheritance Support System (TCMISS)



Figure 2 Traditional Chinese Medicine Inheritance Support System (TCMISS)

Results

Frequency of acupoint selection

A total of 85 acupoints were used in 85 research literature and the total usage of acupoints were 583 times. Use of "Frequency statistics" to calculate the frequency of use of each acupoints. Excel was used to find the frequency as well and return with the 17 most used acupoints. The top 5 acupoints according to the frequency were Baihui (DU20), Taichong (LR3), Neiguan (PC6), Shenmen (HT7) and Sishenchong (EX-HN1). See table 1, figure 3

Table 1 Acupoint frequency for acupuncture treatment of PSD

No.	Acupoint	Frequency	%	Meridian
1	百会 (DU20)	55	69.62%	Governing Vessel
2	太冲 (LR3)	46	58.23%	Yin
3	内关 (PC6)	39	49.37%	Yin
4	神门 (HT7)	34	43.04%	Yin
5	四神聪 (EX-HN1)	30	37.97%	Extra point
6	神庭 (GV24)	28	35.44%	Governing Vessel
7	三阴交 (SP6)	24	30.38%	Yin
8	印堂 (EX-HN6)	20	25.32%	Extra point
9	足三里 (ST36)	19	24.05%	Yang
10	膻中 (CV17)	18	22.78%	Renmai
11	肝俞 (BL18)	17	21.52%	Yang
12	人中 (GV26)	17	21.52%	Governing Vessel
13	心俞 (BL15)	15	18.99%	Yang
14	合谷 (LI4)	14	17.22%	Yang
15	肾俞 (BL23)	14	17.22%	Yang

No.	Acupoint	Frequency	%	Meridian
16	脾俞 (BL20)	12	15.19%	Yang
17	阳陵泉 (GB34)	11	13.92%	Yang

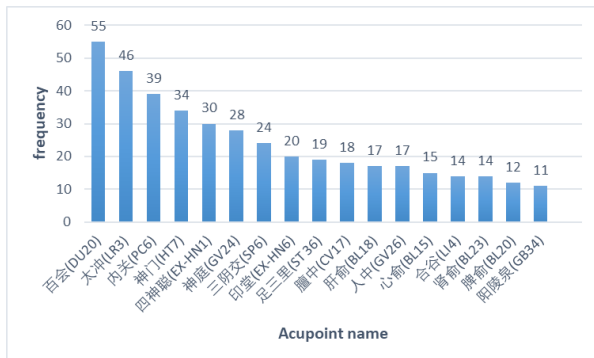


Figure 3 Acupoint frequency for acupuncture treatment of PSD

Analysis of the rule of acupoint selection

In the “Rule of acupoint group” module, the amount for analysis was set to 20 (in the samples were less than 20 entries) and confidence level at 0.6 (Indicating a confidence level of over 60%). The top 10 mostly used acupoint combinations are shown in table 2 and figure 4. The rule of compatibility came out with 10 results is shown in table 3. Results from the “Show table” function of the acupoint grouping are shown in figure 5 (Support 20%), figure 6 (Support 30%) and figure 7 (Support 40%).

Table 2 Acupoint combination frequency statistics table

No.	Acupoint groups	Frequency
1	百会(DU20) – 内关(PC6)	32
2	百会(DU20) – 太冲(LR3)	31
3	百会(DU20) – 神门(HT7)	29
4	太冲(LR3) – 内关(PC6)	28
5	百会(DU20) – 神庭(EX-HN6)	25
6	太冲(LR3) – 神门(HT7)	24
7	内关(PC6) – 神门(HT7)	24
8	百会(DU20) – 太冲(LR3) – 内关(PC6)	23
9	百会(DU20) – 内关(PC6) – 神门(HT7)	22
10	百会(DU20) – 四神聪(EX-HN1)	20

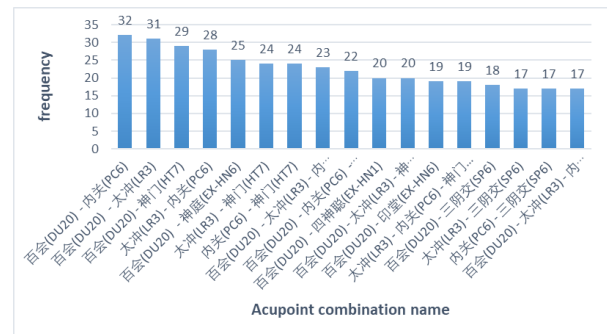


Figure 4 Acupoint combination frequency statistics table

Table 3 Statistical Table of Acupoint Rules

No.	Rule	Confidence
1	印堂(EX-HN6) → 百会(DU20)	0.95
2	内关(PC6), 神门(HT7) → 百会(DU20)	0.91666667
3	太冲(LR3), 内关(PC6), 神门(HT7) → 百会(DU20)	0.894736842
4	神庭(EX-HN6) → 百会(DU20)	0.892857143
5	神门(HT7) → 百会(DU20)	0.852941176
6	百会(DU20), 太冲(LR3), 神门(HT7) → 内关(PC6)	0.85
7	太冲(LR3), 神门(HT7) → 百会(DU20)	0.833333333
8	太冲(LR3), 内关(PC6) → 百会(DU20)	0.821428571
9	内关(PC6) → 百会(DU20)	0.820512821

Note: “→” means that the left and right points often appear as a combination at the same time; the closer the confidence is to 1, the greater the frequency of the combination.

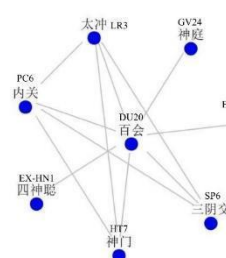


Figure 5 Support is 20%

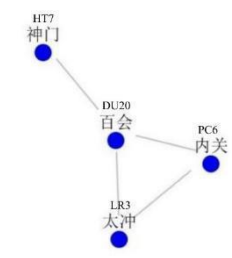


Figure 6 Support is 30%



Figure 7 Support is 40%

The network display diagram shows: when the support is (20%) (figure 5), it can fully display the use of acupoints: when the support is 30% (figure 6), the acupuncture points clearly show the formula of the formula, and Baihui (DU20) often It is used in combination with several acupoints; when the support reaches 40% (figure 7), it is clearly obtained that the acupoint with the highest frequency of use with Baihui

(DU20) is Neiguan (PC6) acupoint. It shows that the main acupuncture points in the prescription of acupuncture treatment for post-stroke depression should be Baihui (DU20) and Neiguan (PC6).

Discussion

Post-stroke depression is a concomitant disease of stroke. Its clinical manifestations include hemiplegia, partial numbness, mouth and tongue askew and unsmooth speech, as well as emotional disturbances seen in depression syndrome, manifested as depressed mood, emotional restlessness, irritability and crying, flank pain, etc. [5-6]. Traditional Chinese medicine believes that PSD belongs to the category of "depression syndrome" in Chinese medicine. Clinical treatment is mostly based on the heart and brain, and is closely related to the liver, spleen and kidney [7]. The etiology and pathogenesis of this disease is that qi, blood, phlegm, and fire stasis block the brain collaterals, causing patients to have anxiety and worry, and affecting the liver's dredging function, causing the liver to lose its balance and qi stagnation. Therefore, acupuncture treatment should adjust the qi mechanism and improve the function of the viscera, so as to achieve the effect of promoting qi and relieving depression, calming the heart and soothing the mind [8].

The study found that the top 4 acupoints with the highest frequency (frequency > 30) in the treatment of PSD are listed in table 1 : Baihui (DU20), Taichong (LR3), Neiguan (PC6), Shenmen (HT7). Baihui (DU20) is the meeting point of all yang, the meeting of the three yang meridians of the hands and feet, the Governing Vessel and the liver meridian, located the top of the head. 《Ling Shu • Wei Qi》 says : "The qi in the head has a street, and if the qi is in the head, it stops in the brain." [9] From the perspective of traditional Chinese medicine and meridian theory, "the brain is the home of the primordial spirit", control the spirit, Baihui (DU20) belongs to the Governing Vessel, and the Governing Vessel connects to the brain, it illustrates the close relationship between the brain and the Governing Vessel. Depression is mainly manifested as abnormal emotions, abnormal activities of "spirit", patients often have symptoms such as decreased interest, decreased appetite, and decreased sense of happiness. Baihui (DU20) has the functions of refreshing the brain and opening the orifices, calming the heart and soothing the mind, calming the liver and subduing the yang, regulates the qi of the Governing Vessel, invigorates the yang qi, and has the effect of refreshing the brain and opening the mind, strengthening the brain and calming the mind. Taichong (LR3) is the Shu-stream point and Yuan-source point of the liver meridian, the liver controls emotions, this acupoint has the functions of clearing liver and improving eyesight, calming liver and relieving wind, soothing liver and gallbladder, activating meridians and collaterals. Taichong (LR3) is the Yuan-source point, it is the place where the original

qi of the viscera passes and stays. The main function of this point is to regulate the deficiency and excess of the liver and the liver meridian, so acupuncture at Taichong (LR3) can soothe the liver and purify fire and regulate emotions. Neiguan (PC6) point is the collateral point of the pericardium meridian of Hand Jueyin, where the eight meridians meet. The pericardium acts on behalf of the heart to receive pathogenic, stores the spirit in the heart, controls the blood vessels, and is the master of the internal organs 《Zhen Jiu Jia Yi Jing》 says: "The mind is sullen and good at panic, the heart is sad, and Neiguan (PC6) is the main ". It is said that the human body's consciousness, thinking and other spiritual activities all depend on the commander of the heart. If the function of the mind governing consciousness is abnormal, abnormality of spirit, consciousness and thinking activities can occur. Acupuncture at this point can adjust the mind, regulate qi and blood, promote the circulation of qi and blood, and relieve mental tension. Shenmen (HT7), Shen means God, is opposite to ghosts; Men means door, the door of entry and exit. The name of this acupoint means that the qi and blood of the internal meridians of the heart meridian are connected to the external meridians of the heart meridian. Shenmen (HT7) is the Shu-stream point and the Yuan-source point of the heart meridian of Hand Shaoyin, this acupoint has the functions of calming the heart and calming the mind, nourishing the heart and nourishing qi, and is good at treating mental disorders.

The analysis of the overall correlation law of acupoint allocation for post-stroke depression shows that the common acupoint combinations with high correlation (frequency>25) (see table 2) are Baihui (DU20) - Neiguan (PC6), Baihui (DU20) - Taichong (LR3), Baihui (DU20) - Shenmen (HT7), Taichong (LR3) -Neiguan (PC6). Baihui (DU20) - Neiguan (PC6): Baihui (DU20) belongs to the Governing Vessel, and the Governing Vessel connects to the brain, the brain is the house of the primordial spirit, and has the power to adjust the mind and refresh the brain; Neiguan (PC6) is the collateral point of the pericardium meridian, and the confluence point of the eight meridians connects the Yin Linking Vessel. The heart controls the blood vessels, stores the spirit, and is the master of the internal organs. It has the effect of widening the chest and regulating qi, opening the orifices and relieving depression. Depression is mainly located in the heart, brain, and liver, and the combination of these two points can refresh the brain and open the mind, calm the heart and soothe the mind. Baihui (DU20) belongs to the Governing Vessel, emphasizes the relationship between the Governing Vessel and the brain, and has the effect of conditioning the brain, spirit, and yang qi; Taichong (LR3) belongs to the Yuan-source point of the liver meridian of Foot Jueyin, which can soothe the liver and regulate qi. The two acupoints are used together to regulate the brain and spirit, soothe the liver and gallbladder, and relieve depression. Baihui (DU20) -

Shenmen (HT7): Baihui (DU20) belongs to the Governing Vessel, and the Governing Vessel enters the brain; Shenmen (HT7) is the Shu-stream point and the Yuan-source point of the heart meridian of Hand Shaoyin, the heart stores the spirit, so acupuncture this point can calm the mind, and combined with Baihui (DU20) in the treatment of mental illness, it has a miraculous effect, and has the effect of invigorating depression and refreshing the brain [10]. Taichong (LR3) - Neiguan (PC6): Taichong (LR3) is the Yuan-source point of the liver meridian of Foot Jueyin. The liver controls the emotions and regulates qi. Taichong (LR3) is the key point for soothing liver and regulating qi; Neiguan (PC6) is the collateral point of the pericardium meridian of Hand Shaoyin, which can adjust the power of mind and spirit. The combination of two points has the effect of soothing the liver and regulating qi, calming the heart and soothing the mind.

From the statistical results in table 3, it can be seen that there are 9 items local and distal compatibility such as Neiguan (PC6) - Shenmen (HT7) - Baihui (DU20), Taichong (LR3) - Neiguan (PC6) - Shenmen (HT7) - Baihui (DU20), etc. Two items are mainly based on local acupoint selection, such as Yintang (EX-HN6) - Baihui (DU20) and Shenting (DU24) - Baihui (DU20), which reflects "where the acupoints are, where the indications are"; Because the lesions of post-stroke depression are located in the brain, the etiology and pathogenesis are closely related to the heart and liver. According to the statistical results, it can be seen that the probability of local acupoint selection combined with distal acupoint selection is the highest, indicating that in clinical treatment of post-stroke depression, the combination of local and distal acupoints at the same time is effective, followed by local selection alone has a certain effect.

Conclusion

Traditional Chinese Medicine Inheritance Support System is an important auxiliary tool for data mining and analysis of hidden clinical information laws. The results of acupoint frequency and acupoint compatibility of clinical acupuncture treatment of PSD can be better summarized, which can provide a reference plan for clinical treatment of PSD, which is suitable for physicians to promote and use without complex syndrome differentiation. Of course, the results obtained in this study are all based on data mining technology, and the specific application should also be combined with clinical practice.

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