

Analysis of points selection pattern in acupuncture treatment of thalamic pain based on data mining

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Abstract: In this study, we used SPSS Statistics26.0 and SPSS modeler 18.0 to conduct data mining on acupuncture points for the thalamic pain (TP). By analyzing 47 acupoint prescriptions, we have found that Sanyinjiao(SP 6), Neiguan(PC 6) and Shuigou(Du 26) are in the first three frequencies of use. And in the analysis of acupoint correlation degree, the support degree of Shuigou(Du 26)-Neiguan(PC 6) was 37.91% in the combination of two acupoints, and that of Sanyinjiao(SP 6)-Neiguan(PC 6)-Shuigou(Du 26) was 27.65% in the combination of three acupoints. From these results we conclude that the core prescription for acupuncture treatment of TP is mostly "Shuigou (Du 26)-Neiguan(PC 6)-Sanyinjiao(SP 6)".

Keywords: acupuncture; thalamic pain; rule of acupoint selection; data mining

1. Introduction

Thalamic pain (TP) is a typical central stroke pain syndrome characterized by the onset of lesions in the thalamus after stroke, with spontaneous pain in the opposite limb, accompanied by or without other deep or superficial sensory disorders ^[1]. According to the relevant epidemiological survey ^[2], the incidence rate of TP after stroke is 8%. And with the aging of society and the trend of mild stroke in middle-aged people, the number of TP patients in China will continue to increase ^[3]. After extensive clinical trials, it has been confirmed that acupuncture has a certain therapeutic effect on this disease and there are few reports of adverse reactions ^[4]. This study is based on modern clinical research literature and uses data mining techniques to analyze and summarize the rules of acupoint selection and prescription for acupuncture treatment of TP, providing reference for optimizing clinical acupuncture plans.

2. Materials and methods

2.1. Literature search

Retrieve a total of 5 database articles, including the CNKI, Wangfang, VIP, Sino Med, and Pub Med. The search time is from the establishment of the database to September 1, 2022. The subject words of the search are "thalamic pain" and "thalamic pain syndrome", and they are combined with "acupuncture", "acupuncture and moxibustion", "electroacupuncture" and "scalp acupuncture" respectively. The English search terms are "thalamic pain", "acupuncture", "acupuncture Therapy", "Electroacupuncture", etc.

2.2. Inclusion Criteria

Research type: randomized controlled trials, clinical observation studies, individual cases. Study subjects: Patients who meet the clinical diagnostic criteria for thalamic pain after examination. Research method: The treatment method is acupuncture alone or in combination with other methods, and the acupuncture technique meets national standards. The acupuncture prescription is clear, except for literature on special acupuncture methods that cannot extract specific acupoints, such as wrist ankle acupuncture, meridian skin acupuncture, etc. The research results show effectiveness.

2.3. Exclusion criteria

For literature that is repeatedly published or has similar content, the one with the most recent publication history shall be selected. Systematic evaluation, meta-analysis, review, theoretical exploration, animal experimental literature. The literature in the case did not clearly distinguish between the main acupoint and the matching acupoint; Identify relevant literature on special populations or areas.

2.4. Literature screening

Import the 749 retrieved articles into the literature manager and screen out how many duplicate articles through the software for the first time. According to the inclusion and exclusion criteria, after reading the entire text, a rescreening was conducted and 33 articles were ultimately included.

2.5. Data normalization processing

Standardized treatment of acupoint names: refer to the Name and Location of Meridian Points (GB/T 12346-2021), Name and Location of Extra Meridian Points (GB/T 12346-2021), and the national standard acupuncture and moxibustion Technical Operation Specifications Part 2: Scalp Acupuncture (GB/T 21709.2-2021) to standardize the acupoint names and meridian tropism^[5-7]. The treatment points, tenderness points, and traditional Ashi acupoints that are not included in the literature are collectively classified as "Ashi acupoints".

2.6. Database construction methods

Use Microsoft Excel to construct a database for "Acupuncture Treatment of Thalamic Pain", with entries including basic literature information (title, author, publication time, research type, number of cases, treatment methods) and intervention measures. Extract the intervention measures information from the above databases and establish separate databases for acupoint selection prescriptions.

2.7. Prescription extraction principles

If there are two or more groups of acupoints used alternately in a literature, they should be split and the main acupoint prescriptions should be extracted separately. When entering the prescription, the acupoint with the same name in the same literature should not be recorded repeatedly once (such as Jiaji acupoint), while the acupoint Ashi can be recorded repeatedly.

2.8. Data processing methods

Use Microsoft Excel to summarize the frequency of acupoint use in the included literature. SPSS Modeler 18.0 software was used to analyze the association rules of main acupoints with a frequency of ≥ 5 times. The Apriori algorithm was used for deep mining, and support and confidence were used to represent the utility of acupoint compatibility. The minimum support was 20%, the minimum confidence was 80%, and the maximum antecedent was 2.

3. Results

3.1. Descriptive analysis results

By screening relevant literature on acupuncture treatment of TP, 33 articles were ultimately included. There were 47 prescriptions were extracted. The main acupoint prescription involves 47 acupoints, with a total use frequency of 247 times. Sanyinjiao (SP 6), Neiguan(PC 6) and Shuigou(Du 26) in the first three frequencies of use. (Table 1)

Table 1: Analysis of the frequency of acupoint use in acupuncture treatment of thalamic pain

Order	Acupoint	Frequency	RF/%
1	Sanyinjiao(SP 6)	15	6.07
2	Neiguan(PC 6)	15	6.07
3	Shuigou(Du 26)	14	5.67
4	Dingniehouxiexian	13	5.26
5	Weizhong(BL 40)	11	4.45
6	Jiquan(HT 1)	10	4.05
7	Waiguan(SJ 5)	8	3.23
8	Jianyu(Li 15)	7	2.83
9	Fengshi(GB 31)	7	2.83
10	Chize(LU 5)	7	2.83
11	Ashi	7	2.83
12	Jiaji(EX-B2)	7	2.83
13	Quchi(LI 11)	6	2.43
14	Xuehai(SP 10)	6	2.43
15	Chengfu(BL 36)	5	2.02

3.2. Correlation analysis

SPSS Modeler 18.0 was used for correlation analysis on the main acupoint prescriptions included in the literature, and it was found that the core acupoint combination for acupuncture treatment of thalamic pain is "Neiguan(PC 6) Shuigou(Du 26)" and "Neiguan(PC 6) Sanyinjiao(SP 6)" (Figure 1). Using support (20% support) and confidence (80% confidence) to represent the effectiveness between acupoints. (Table 2)

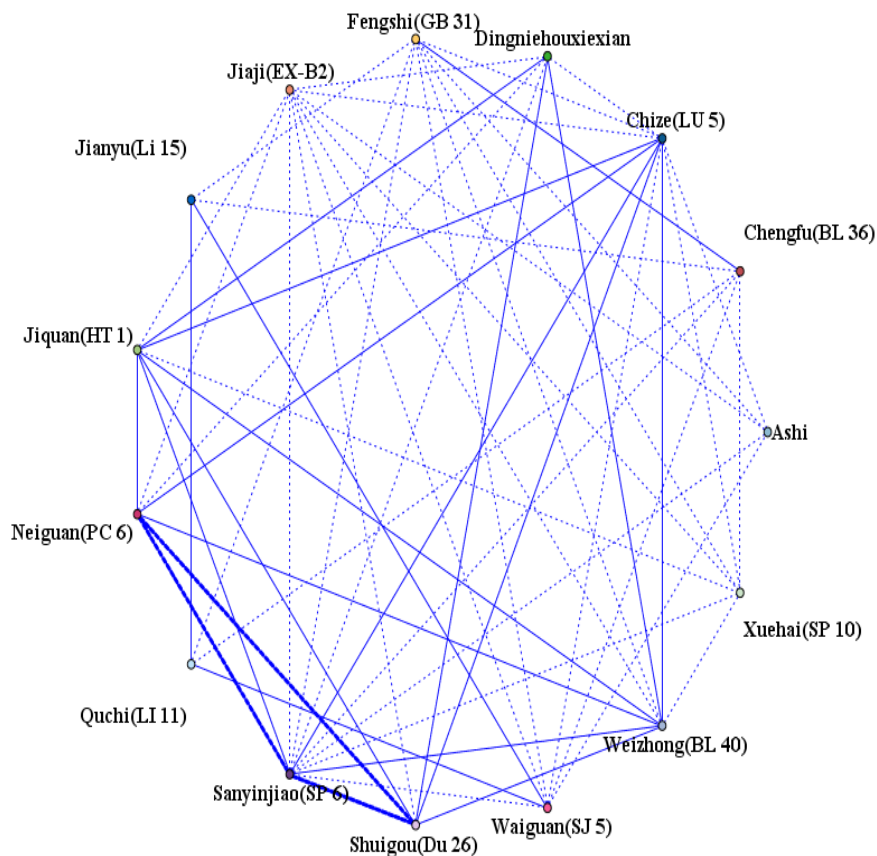


Figure 1: Core acupoint correlation network diagram for acupuncture treatment of TP

Table 2: Analysis of the Association Rules of Acupuncture Treatment for Thalamic Pain Including Literature Points

Order	Combination		Support (%)	Confidence (%)
	Latter item	Former item		
1	Shuigou(Du 26)	Neiguan(PC 6)	31.91	86.66
2	Neiguan(PC 6)	Shuigou(DU 26)	29.78	92.85
3	Sanyinjiao(SP 6)	Neiguan(PC 6), Shuigou(DU 26)	27.65	84.61
4	Jiquan(HT 1)	Weizhong(BL 40)	23.40	90.90
5	Shuigou(Du 26)	Weizhong(BL 40)	23.40	81.81
6	Sanyinjiao(SP 6)	Weizhong(BL 40)	23.40	90.90
7	Shuigou(Du 26)	Neiguan(PC 6), Sanyinjiao(SP 6)	23.40	100.00
8	Neiguan(PC 6)	Shuigou(Du 26), Sanyinjiao(SP 6)	23.40	100.00
9	Weizhong(BL 40)	Jiquan(HT 1)	21.27	80
10	Neiguan(PC 6)	Jiquan(HT 1)	21.27	90
11	Shuigou(Du 26)	Jiquan(HT 1)	21.27	90
12	Sanyinjiao(SP 6)	Jiquan(HT 1)	21.27	80
13	Neiguan(PC 6)	Jiquan(HT 1), Weizhong(BL 40)	21.27	90
14	Shuigou(Du 26)	Jiquan(HT 1), Weizhong(BL 40)	21.27	90
15	Sanyinjiao(SP 6)	Jiquan(HT 1), Weizhong(BL 40)	21.27	90
16	Jiquan(HT 1)	Weizhong(BL 40), Sanyinjiao(SP 6)	21.27	80
17	Neiguan(PC 6)	Weizhong(BL 40), Sanyinjiao(SP 6)	21.27	80
18	Shuigou(Du 26)(DU 26)	Weizhong(BL 40), Sanyinjiao(SP 6)	21.27	90

4. Discussion

4.1. Current research status of TP

Modern medicine believes that the occurrence of TP is related to damage to the spinal cord thalamic tract after stroke, central sensitization, oxidative stress, inflammatory reactions, and neuronal cell damage [8]. Traditional Chinese medicine believes that TP should belong to the categories of diseases such as "stroke". After a stroke, patients may experience qi and blood deficiency, wind and phlegm obstructing the meridians, cold clotting the meridians, or blood stasis obstructing the veins, resulting in blood stasis and pain due to insufficient qi and blood. According to the "Miscellaneous Works of Ming Medicine", "The ancients did not mention various symptoms of stroke, such as withering, numbness, and soreness. The origin was blood deficiency, dead blood, and phlegm drinking." Therefore, the pathogenesis of this disease is based on the principle of deficiency, with cold coagulation, phlegm turbidity, and excessive blood stasis as the criteria.

At present, in clinical practice, Western medicine mostly uses oral antiepileptic, antidepressant and other Western medicine drugs for the treatment of thalamic pain [9]. According to statistical results, it is found that traditional Chinese medicine acupuncture often uses various specific methods such as filiform needle acupuncture or combined with scalp acupuncture, electroacupuncture, and bloodletting puncture in the treatment of TP. The author consulted relevant literature and found that [10,11]: Acupuncture can regulate plasma substance P and β Endorphin and other neurotransmitters promote the expression of ADCY1 protein to protect nerve cells or improve the blood supply of vertebral artery and basilar artery to alleviate the pain symptoms of TP patients, which indicates that acupuncture can treat TP through multiple ways and layers, and as a green treatment method, it enriches the clinical treatment scheme of thalamic pain.

4.2. Analysis on the regularity of acupuncture in treating TP

The main acupoint prescription involves 47 acupoints, with the top three most frequently used being Sanyinjiao(SP 6), Neiguan(PC 6), and Shuigou(Du 26). Among them, Sanyinjiao(SP 6) and Neiguan(PC 6) have the highest frequency of use, both of which are 15 times. The correlation analysis of acupoints showed that the support for Shuigou(Du 26) and Neiguan(PC 6) in the double acupoint combination was 31.91%, while the support for Sanyinjiao(SP 6), Neiguan(PC 6), and Shuigou(Du 26) in the three acupoint combination was 27.65%. Shuigou(Du 26) is the meeting between the Du meridian and the Yangming meridian of the hands and feet. Acupuncture of Shuigou(Du 26) has the

effect of regulating the Du meridian, opening and closing the orifices, awakening the vitality, and regulating the organs; Neiguan(PC 6) is a collateral acupoint of the Hand-Jueyin Pericardium Meridian, which can penetrate the meridians of the Three Jiao meridians, dredge the Qi of the Three Jiao meridians, and connect to the Yin Wei meridians. It can overflow and accumulate Qi and blood to promote the movement of Qi and relieve pain, and is good at regulating the heart and mind. Acupuncture of Neiguan(PC 6) can to some extent improve disease pain and anxiety and depression caused by it^[12]. Sanyinjiao(SP 6) is the meeting point of foot Sanyinjiao(SP 6), which can nourish the three yin, strengthen the spleen and absorb blood, nourish qi and liver, and nourish the kidney and marrow. Therefore, when the kidney essence is full, the brain and marrow are filled, and the brain can function normally. The author analyzes that the combination of the three acupoints of Sanyinjiao(SP 6), Neiguan(PC 6), and Shuigou(Du 26) is the core acupoint for treating TP. In addition, these three acupoints are also the core main points of the "Xingnao Kaiqiao" acupuncture method. Research has shown that^[13]: Xingnao Kaiqiao acupuncture can improve the metabolic function of the brain, promote the recovery of brain cell activity, and promote the recovery of mind and Qi circulation.

In summary, the core prescription for acupuncture treatment of thalamic pain is mostly "Shuigou(Du 26)-Neiguan(PC 6)-Sanyinjiao(SP 6)". However, due to the limited literature included in this study, it may have a certain impact on the accuracy of the results, and further improvement research is needed in the future.

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