Acupuncture and Moxibustion Treatment of Mild Cognitive Impairment Based on Data Mining

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Abstract. Acupuncture and moxibustion therapy, as a traditional medical treatment method of the motherland, is widely used in the treatment of mild cognitive dysfunction, with remarkable curative effect, and is increasingly recognized by the medical community. However, so far, there is no acupuncture prescription and acupoint usage rules for acupuncture treatment of mild cognitive impairment. Therefore, it is of great significance to collect, organize and data mining related data in order to summarize the relationship between acupuncture points and mild cognitive dysfunction, and to provide references for clinical treatment. This article standardizes the acupuncture points in the database. This paper uses Excel and SPS software to carry out frequency analysis, cluster analysis and association rules, and draws the rules of acupoints, meridians, positions, frequency of specific acupoints, clustering of acupoints and compatibility. In this paper, the number of cases in the treatment group and the control group, the main acupoints and matching points of the acupuncture prescription, the treatment methods, the efficacy evaluation indicators, and the total effective rate of the treatment group and the control group are extracted into the Excel table to form a mild cognition of acupuncture treatment Prescription database for dysfunction. This article studies the rules and characteristics of acupuncture points derived from data mining, takes the general rules and characteristics of clinical acupuncture and moxibustion treatment as a reference for clinical acupuncture and moxibustion, and verifies it with the results obtained. The experimental results show that in the analysis of association rules, taking Baihui and Shenting as examples, the support degree indicates that the probability that the two acupoints appear in the 126 heads at the same time is 51.83%, and the confidence and support for the occurrence of Baihui and Shenting are relatively high. High, it is considered to be a common compatible point pair for acupuncture treatment of mild cognitive dysfunction.
Keywords: Data Mining, Acupuncture Treatment, Mild Cognitive Impairment, Cluster Analysis

1. Introduction
So far, modern medicine has no effective drugs for this disease [1-2]. The clinically proven drug is acetylcholinesterase inhibitor, which is now widely used in the treatment of patients with mild cognitive impairment [3-4]. In addition, nootropics, anti-glutamatergics, antioxidants, and non-steroidal anti-inflammatory drugs may be effective in the treatment of mild cognitive dysfunction [5-6]. However, the long-term use of drugs such as acetylcholinesterase inhibitors has large side effects, so finding a treatment with a higher safety factor has become an urgent need for medical workers to treat mild cognitive dysfunction [7-8].

In the research on the acupuncture and moxibustion treatment of mild cognitive impairment based on data mining, many scholars have studied it and achieved good results. Lee SMK uses data mining technology to analyze the selection and compatibility of acupuncture and moxibustion treatment points the formation of acupoint selection rule spectrum and compatibility optimization rule spectrum, to provide basis and theoretical support for selecting acupoints for clinical acupuncture treatment of puffiness [9]. Song YJ aims at processing massive, fuzzy, and non-linear data and revealing the advantages of potential prescription laws. Data mining technology analyzes the prescription laws of acupuncture and moxibustion treatment in books to better serve clinical services [10].

The rules and characteristics of acupuncture points derived from the data mining in this article are basically consistent with the general rules and characteristics of acupuncture and moxibustion clinical treatment. Therefore, the results of this study can be used as a reference for clinical acupuncture and moxibustion, and the effectiveness of the results still requires high quality the clinical research methods are validated.

2. Method of Acupuncture and Moxibustion Treatment of Mild Cognitive Impairment Based on Data Mining

2.1. Data Mining Research on Acupuncture Treatment of Mild Cognitive Dysfunction

2.1.1. Entropy clustering method for complex systems. First, establish a database with the data of acupuncture prescriptions, proven prescriptions, and famous prescriptions in famous books, and conduct data analysis and mining to find the core combination of acupoint prescriptions, the prescription rules, and the usage of each acupoint in the prescription, and aggregate new ones. Prescription and core combination. Network analysis regards the overall structure of the researched things as the interacting units in the network things (such as a specific certificate and an acupoint) as the nodes in the network, and the interaction between the units is regarded as the connection in the network. Line, the direction of action can give the line a direction. In the whole clinical practice of acupuncture and moxibustion, limited syndromes and limited acupoints are combined and paired to construct a "syndrome-acupoint" relationship network. The overall structure of this network reflects the overall structure of acupuncture clinical thinking. In this study, the visualization diagram of the directed network structure of "Zheng-yi-point" shows the complexity of the overall structure of the "Zheng-yi-point" relationship, which indicates the complexity of acupuncture and moxibustion clinical thinking and the quantitative analysis of the "zheng-yi-point" relationship necessity.

2.1.2. Association analysis method. In theory, association rule mining refers to discovering interesting associations or correlations from a large data set, that is, identifying frequently occurring attribute value sets from the data set, also called frequent itemsets, and then using these frequent sets the process of creating rules describing association relationships. In this study, acupuncture prescriptions consist of acupoints, and acupoints are closely related to concepts such as the types of specific
acupoints and the meridian they belong to. Therefore, the application and compatibility of specific acupoints are found by the multi-layer association rule analysis method.

2.1.3. Establish a literature research database. Use Microsoft Excel to organize the collected data, and standardize and uniformly process the data to eliminate interference factors that affect the research results. The processed literature data is entered into the literature research database according to relevant standards, and finally the literature research content is statistically analyzed. The database contains the following sub-databases: acupoint basic information database and literature database of works. The establishment of the standard database lays a solid foundation for further in-depth literature analysis, literature data law discussion and data mining.

2.2. Exploration and Analysis of the Law of Point Selection

2.2.1. "Zhongwan" point. The "Zhongwan" point is located on the upper abdomen of the human body, on the front midline, 4 inches above the middle of the umbilicus. It belongs to the Ren Channel, runs through the abdomen and intersects with the Foot-Yangming Stomach Meridian, so acupuncture at this acupoint can fill up the stomach; the organs will meet the middle and the fullness of the stomach is located in the stomach. It belongs to the six-fu-organs, and the six-fu-organ diseases can be treated with Zhongwan.

2.2.2. "Zusanli" point. The "Zusanli" point is on the outside of the calf, 3 inches below Dubi, and above Dubi and Xiexi. Based on the theoretical guidance of "Hezhi Neifu" and "The meridians pass, the main treatment is reached", this point has a significant therapeutic effect on gastric-related diseases; The sea of water valley and the sea of gas in the abdomen are combined. The stomach of the sea of water valley is in the gas street and goes down to three miles. When the four seas are sick, they can be treated with the acupoints where the Qi connects.

2.2.3. "Neiguan" point. The "Neiguan" point is on the palm side of the forearm, on the line connecting Quze and Daling, 2 inches above the transverse stripes of the wrist, between the palmar longus tendon and the flexor carpi radialis tendon. It is the collateral point of the pericardium meridian of hand Jueyin. The collateral point mainly treats the symptoms of the outer and inner meridians. The hand Jueyin meridian and the Sanjiao meridian correspond to the outer and inner sides. Therefore, acupuncture at Neiguan point can regulate the three-joule qi machine. Self-stop; Neiguan is also one of the eight meridian junction points, which is good at treating gastro-cardiothoracic diseases and has a special therapeutic effect on fullness. Therefore, acupuncture at Neiguan point can have the effect of smoothing the flushing and reducing the anti-blood fullness.

2.2.4. "Weishu" point. The "Weishu" point is located on the back, below the spinous process of the 12th thoracic vertebra, 1.5 inches laterally. It belongs to the Backshu point, where the stomach qi is infused on the back. It belongs to the foot sun bladder meridian. The back dominates the yang. It is good at treating yin syndrome. Therefore, the Weishu point can make the stomach Qi smooth, especially suitable for cold syndrome full.

2.2.5. "Gongsun" point. The "Gongsun" point is on the medial edge of the foot, at the front and underside of the base of the first metatarsal bone. It belongs to the spleen meridian of the foot Taiyin, a collateral point, and the spleen meridian and the stomach meridian are in line with each other. Moreover, it is also a point at the intersection of the eight pulses, which can relieve the qi of rushing and counteracting, and smooth the spleen and stomach, and achieve the effect of treating spleen.

2.3. Support Threshold Setting Method Based on the User Priority Model

2.3.1. Multi-dimensional association mining. A multidimensional association rule is an association
rule involving one or more dimensions (attributes). The mining meta-mode of multi-dimensional association mining query is defined as follows:

$$MRMP: < S_{tid}, S_{attr}, wc, \min\_supp, \min\_conf >$$  \hspace{1cm} (1)

Among them, $S_{tid}$, $S_{attr}$, $wc$, $\min\_supp$, and $\min\_conf$ are all components of the query, representing: transaction ID number set (data interval size), mining attribute set of interest, optional "where" conditions, minimum support, Minimum confidence.

2.3.2. Meaningful mining attribute matching strategy. Let $Attr_u$ and $Attr_p$ be $S_{attr}$ constructed by the user and $S_{attr}$ from the user priority model, respectively. Suppose $Attr_u = \{m_{u1}, m_{u2}, ..., m_{ui}\}$, $Attr_p = \{m_{p1}, m_{p2}, ..., m_{pj}\}$. The similarity between $Attr_u$ and $Attr_p$ is defined as follows:

$$SM_{M}(Attr_u, Attr_p) = \frac{|Attr_u \cap Attr_p|}{|Attr_u \cup Attr_p|}$$  \hspace{1cm} (2)

For example, let

$$Attr_u = \{PordName, Education\}, Attr_p = \{PordName, City, Age\}$$  \hspace{1cm} (3)

3. Experimental Study on Acupuncture and Moxibustion Treatment of Mild Cognitive Impairment Based on Data Mining

3.1. Subject
According to the diagnostic criteria, patients with mild cognitive impairment are clearly diagnosed; treatment and comparison measures: The experimental group is based on acupuncture and moxibustion, which can include other basic therapies such as integrated traditional Chinese and western medicine. The odd acupoints and Ashi acupoints also include the internationally accepted scalp acupuncture standard treatment line; the acupuncture technique conforms to the category of "Needling and Moxibustion Law", and the specifications and manufacturers of acupuncture appliances are not restricted. The control group can be blank control, placebo control (fake acupuncture comfort), Western medicine control, traditional Chinese medicine control, and other non-drug treatment factors with clear curative effect; when basic therapy is involved, the treatment group must be consistent with the control group.

3.2. Database Construction
Data extraction includes: the name of the example, the author, the time of publication, the number of cases in the treatment group and the control group, the main acupoints and matching points of the acupuncture prescription, the treatment methods of the treatment group and the control group, the efficacy evaluation indicators, the total effective rate of treatment, etc. The information is extracted into an Excel table; at the same time, a new Excel table is created to arrange the acupoints in all acupuncture prescriptions longitudinally, and mark the meridian and acupoint attributes of each acupoint to form a prescription for acupuncture and moxibustion treatment of mild cognitive impairment. Acupoint database.

4. Experimental Research and Analysis of Acupuncture and Moxibustion Treatment of Mild Cognitive Impairment Based on Data Mining

4.1. Results of Acupoint Association Rules
According to the results of the analysis of high-frequency acupoint association rules, this study selected acupoint association groups with support $> 44\%$ and confidence $> 86\%$, and a total of 10 acupoint association groups were obtained, specifically: Baihui—Taixi; Baihui—Shenting; Baihui-Zusanli; Baihui-Sanyinjiao; Baihui-Sishencong; Sanyinjiao-Neiguan. The details are shown in Table 1:
**Table 1. Analysis of Acupoint Association Rules**

| Antecedent  | Support(%) | Confidence(%) |
|-------------|------------|---------------|
| Taixi       | 58.36      | 85.23         |
| God Court   | 48.27      | 98.53         |
| D           | 52.15      | 89.57         |
| Sanyinjiao  | 44.12      | 89.42         |
| Four gods   | 47.23      | 98.15         |

**Figure 1. Analysis of acupoint association rules**

As shown in Figure 1, in the analysis of association rules, taking Baihui and Shenting as examples, the support degree indicates that the probability that the two acupoints appear in the 126 heads at the same time is 51.83%, and the confidence degree indicates that in the prescription of Baihui, Shenting the probability of occurrence is 10%. The Baihui and Shenting acupoints have a high degree of confidence and support, and they are considered to be a commonly used pair of acupuncture points for the treatment of mild cognitive impairment. The other most commonly used acupoint compatibility: Baihui and Taixi, Baihui and Zusanli, Baihui and Sanyinjiao, Baihui and Sishencong, Sanyinjiao and Neiguan, Baihui and Neiguan, Taixi and Zusanli and Baihui, Baihui and Fengchi, Shenting and Fengchi. From the above common acupoint compatibility, it can be concluded that in the treatment of mild cognitive dysfunction, modern physicians often use Baihui acupoints, combined with acupoints for invigorating the kidney and spleen, and head and face acupoints, which reflects that local acupoints are mainly selected in treatment, combining the characteristics of dialectical point selection.

### 4.2. Location and Frequency of Acupoints

The analysis of the location of acupoints refers to finding out the rules of the location of the acupoints by analyzing the body parts involved in the acupoints. According to the statistical results, the most involved part of the selection of acupoints is the head, face and neck, with a ratio of 36.25%, followed by the lower limbs, with a ratio of 35.23%. Statistics of the location and frequency of the acupoints. See Table 2 for the specific acupoints and frequencies of each location.

**Table 2. Acupuncture and moxibustion treatment of mild cognitive impairment, the frequency of selection of acupoints**

| Location              | Frequency(%) | Number of acupoints |
|-----------------------|--------------|---------------------|
| Head, face and neck   | 36.25        | 40                  |
| Lower limbs           | 35.23        | 24                  |
| Upper extremity       | 17.94        | 9                   |
| Chest and abdomen     | 6.39         | 6                   |
| Back                  |              |                     |
According to the frequency of the location, head, face and neck, lower limbs, upper limbs, chest and abdomen, and back. Among them, the head, face, neck, and lower limbs are used most frequently, with a frequency of 36.25% and 35.23%, followed by acupoints on the upper limbs, with a frequency of 17.94%. This suggests that acupuncture treatment of mild cognitive impairment should be performed at the proximal part and the distal part. Point selection is based on the principle of point selection, focusing on matching points up and down, and points far and near.

5. Conclusions
Based on the results of this data mining, this paper found that acupuncture and moxibustion are used to select acupoints for the treatment of mild cognitive dysfunction. Modern physicians mainly select acupoints locally, combined with dialectical acupoints; The Baihui point of Haidu Channel is used most frequently; the point compatibility pays attention to the principle of matching upper and lower points, and matching points far and near. Among the compatibility, Baihui points are more selected, and the points are combined with acupoints for nourishing the kidney and strengthening the spleen.

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