Analysis of Drug Use Rules of Traditional Chinese Medicine for Dysmenorrhea Based on Data Mining

L Bai 1, X P Wei 1 and M S Miao1*
1Henan University of Chinese Medicine. 450046. China

Any correspondence should be addressed to the author X P Wei. Email: weixiangping196@163.com

*Corresponding author: M S Miao. Email: miaomingsan@163.com;

Abstract. Objective: Based on data mining, traditional Chinese medicine is used to treat dysmenorrhea. Methods: using the journal literatures collected by cnki as the data source and using the software of Excel 2013, SPSS Modeler 14.1 and SPSS Statistics 19.0, the association rule analysis and factor analysis of the included standard Chinese medicine were carried out. Results: among the 111 prescriptions included in the standard, angelica sinensis and Corydalis rhizoma were the most common. The medicinal property is mainly warm and smooth, and the bitterness and bitterness are the main ingredients, Meridian of liver in the majority. In association rule analysis, 10 combinations of drug pairs with the highest association strength were found, and 5 common factors were extracted from factor analysis. Conclusion: By using modern information technology and combining TCM clinical data with big data for in-depth analysis and integration, the potential compatibility rules of TCM for dysmenorrhea treatment can be more easily explored and finally fed back to the clinic, providing a basis for clinical safer and more rational drug use and new prescription research and development.

1. Introduction

Dysmenorrhea refers to the disease in which women have pain and flatulence in the lower abdomen, accompanied by general discomfort and other symptoms before and after menstruation [1]. It seriously affects patients’ physical and mental health, work and study, and life quality. Therefore, the treatment of dysmenorrhea is of great significance for improving women’s physical and mental health and life quality [2].

Traditional Chinese medicine has accumulated rich clinical experience in the treatment of this disease, and its medication characteristics and laws are mostly reflected in the prescriptions of past dynasties [3]. This study intends to use literature methods, supplemented by computer statistical means, to sort out and analyze the prescriptions for dysmenorrhea in cnki, so as to provide references for clinical medication. Dysmenorrhea has a variety of causes and complicated pathogenesis. The basic pathogenesis is stasis cyst, and the circulation of menstrual blood is blocked, resulting in “pain due to insufficiency” [4]. Currently, modern medicine has recognized that increased prostaglandin (PG) and interleukin (IL) are the main pathogenesis of primary dysmenorrhea, and dysfunction of vascular endothelial cells is also related to primary dysmenorrhea [5]. Western medicine believes that it is caused by the strong contraction of the uterine wall spiral artery and uterine smooth muscle, hypoxia and ischemia. The treatment is mainly the symptomatic analgesic treatment such as non-steroidal anti-inflammatory drugs and oral contraceptives, which can only be relieved but cannot be cured [6]. In this paper, using the modern information technology, through the analysis of the domestic with TCM...
characteristic method in the treatment of dysmenorrhea clinical medicine research literature, mining of traditional Chinese medicine clinical medicine for the treatment of dysmenorrhea and potential drug combinations, in order to discover new drugs for combination and attending disease, give full play to the advantage of compatibility of traditional Chinese medicine (TCM), providing theoretical basis for dysmenorrhea clinical drug use.

2. Materials and methods

2.1. Data sources
Fill in "dysmenorrhea" in "professional search" of "advanced search" in cnki database. From January 2015 to January 2019, a total of 3515 journal articles were retrieved.

2.2. Inclusion criteria
Clinical research on prescription of traditional Chinese medicine for dysmenorrhea, experience in drug use of famous traditional Chinese medicine and literature of prescriptions clearly provided, the literature contains all the specific prescriptions of traditional Chinese medicine.

2.3. Exclusion criteria
Duplicate literatures were excluded, basic studies such as cell and animal studies were excluded, non-clinical studies such as review and theoretical discussion were conducted, combined use of traditional Chinese and western medicine was conducted, and literatures such as specific drugs or single traditional Chinese medicine were not included.

2.4. Data processing
111 journal literatures were selected preliminarily, and the basic formulae of 111 prescriptions in the literatures were input and processed, and the addition and subtraction formulae were deleted, so as to establish the database of traditional Chinese medicine. The name, classification, nature and taste of drugs were unified by referring to the 2015 edition of Chinese pharmacopoeia \(^{[7]}\) and Chinese pharmacology \(^{[8]}\).

2.5. Data analysis
SPSS Modeler 14.1 was used to conduct networked visual analysis and display of the included Chinese medicine, and Apriori modeling was used for association rule analysis. Common factors were extracted using SPSS Statistics 19.0 for factor analysis.

3. The results \(^{[9-12]}\)

3.1. Use of single traditional Chinese medicine
By sorting all traditional Chinese medicines in 111 prescriptions involved in the literature, it can be seen that there are 146 kinds of traditional Chinese medicines in total, with a cumulative frequency of 1256 times. Among 111 prescriptions, 21 drugs with frequency 20 were used, with a total of 761 times. The top five most frequently used herbs were Angelica sinensis (85 times, 76.6%), Corydalis rhizoma (69 times, 62.2%), Bupleurum chinense (62 times, 55.9%), Glycyrrhiza uralensis Fisch. (60 times, 54.1%), and Cyperus rotundus (54 times, 48.6%). Drugs with frequency of >20 were used, as shown in table 1.

| Drug name              | frequency | Percentage (%) | Drug name              | frequency | Percentage (%) |
|------------------------|-----------|----------------|------------------------|-----------|----------------|
| Angelica sinensis      | 85        | 76.6           | Bupleurum chinense     | 27        | 24.3           |
| Corydalis rhizoma      | 69        | 62.2           | Carthamus tinctorius L. | 24        | 21.6           |
| Plant Name                      | Frequency | Oder      | Plant Name                      | Frequency | Oder    |
|--------------------------------|-----------|-----------|--------------------------------|-----------|---------|
| Ligusticum guanxiong Hort.     | 62        | 55.9      | Persicae semen                 | 24        | 21.6    |
| Glycyrrhiza uralensis Fisch.   | 60        | 54.1      | Glycyrrhizae.                  | 24        | 21.6    |
| Cyperus rotundus               | 54        | 48.6      | Evodia rutaecarpa (Juss.) Benth.| 23        | 20.7    |
| Cynanchum otophyllum           | 49        | 44.1      | Leonurus artemisia (Laur.) S. Y. Hu F | 22        | 19.8    |
| Cinnamomum cassia Presl        | 33        | 29.7      | Cinnamomum cassia Presl        | 22        | 19.8    |
| Faeces Trogopterori            | 32        | 28.8      | Curcuma zedoaria (Chrstm.) Rosc | 21        | 18.9    |
| Paeonia lactiflora Pall.       | 30        | 27.0      | Sparganii rhizoma              | 21        | 18.9    |
| Salvia miltiorrhiza Bunge       | 30        | 27.0      | Poria                         | 20        | 18.0    |
| Lindera aggregata(Sims) Kosterm.| 29        | 26.1      |                                |           |         |

3.2. Usage of medicinal properties and odors

Use of medicinal properties as shown in “figure 1”.

![Figure 1. Statistics flavour and properties of a drug.](image)

3.3. Medication administration

Among the 146 herbs, there were 21 herbs with frequency 20, and the cumulative frequency was 54 times. It can be seen that liver meridian (16 times, 29.6%), spleen meridian (12 times, 22.2%), heart meridian (11 times, 20.4%) and kidney meridian (4 times, 7.4%) are the most common, as shown in “figure 2”.

![Figure 2. Channel tropism and statistics of drugs.](image)
3.4. High Frequency Drug Association Rules Analysis

For high-frequency drugs (use frequency 25), the potential drug combinations in common formulations were discovered, and 10 core drug combinations were obtained in total. The degree of improvement of all drug combinations was greater than 1, indicating that these drug combinations were statistically significant. With angelica as the core drug, the statistical results of 10 core drug combinations are shown in table 2, and the association “network display” is shown in figure 3.

Table 2. Analysis of association rules between drugs.

| Drug combination                        | Support (%) | Confidence (%) | Lifting degree |
|-----------------------------------------|-------------|----------------|---------------|
| Angelica sinensis-Corydalis rhizoma     | 62.5        | 80.0           | 1.054         |
| Angelica sinensis-Ligusticum chuanxiong Hort. | 55.357      | 96.774         | 1.275         |
| Angelica sinensis-Glycyrrhiza uralensis Fisch. | 50.0        | 92.857         | 1.224         |
| Angelica sinensis-Cyperus rotundus      | 46.429      | 90.385         | 1.191         |
| Corydalis rhizoma-Cyperus rotundus      | 46.429      | 82.692         | 1.323         |
| Angelica sinensis-Cynanchum otophyllum  | 43.75       | 93.878         | 1.237         |
| Angelica sinensis-Faeces Trogopterori   | 27.679      | 83.871         | 1.105         |
| Corydalis rhizoma-Faeces Trogopterori   | 27.679      | 80.645         | 1.29          |
| Angelica sinensis-Cynanchum otophyllum-Cyperus rotundus | 26.786 | 80.0 | 1.6 |
| Corydalis rhizoma-Paeonia lactiflora Pall. | 25.0        | 82.143         | 1.314         |

Figure 3. Association network display between high frequency drugs.

3.5. High Frequency Drug Factor Analysis

Factor analysis was performed on high-frequency drugs (use frequency 20) with SPSS Statistics 19.0 statistical software, and the KMO Statistics were 0.618, Bartlet spherical test and P =0.000, indicating that it was suitable for factor analysis. Principal component analysis method was adopted to extract the five components of the initial value characteristic value >1, and the cumulative contribution rate of the factors was 65.438%, that is to say, most of the information could be covered. The composition matrix of the rotating components was obtained through the Kaiser standardized total rotation method, as shown in “figure 4”. Five common factors can be obtained by classifying drugs into the common factors with the highest contribution value, as shown in table 3.
4. Discuss
Since the first thing to treat dysmenorrhea is to stop the pain, therefore, analgesic and dispersing blood stasis drugs are the first choice for their compatibility, supplemented by tonic drugs as appropriate. When it is compatible with drugs for invigorating qi and blood, qi and blood are always taken into account, which reflects the principle of qi and blood exchange in TCM. At the same time of enhancing the tonic effect, the drugs of invigorating qi, activating blood circulation and dispersing blood stasis should be enhanced correspondingly, so as to avoid the stagnation of the tonic drugs [14]. Radix angelicae sinensis - Cynanchum otophyllum is a common drug in clinical practice. Radix angelicae sinensis is sweet and warm, nourishing blood and replenishing Yin, both of which have the effect of regulating liver and relieving pain [15].

By analyzing the clinical research literature of traditional Chinese medicine in treating dysmenorrhea, this paper preliminarily summarizes the medication law of dysmenorrhea, and expects that in the process of screening dysmenorrhea drugs in the future, the potential drug pair or single drug derived from this data mining can be used for in-depth research. Yin and Yang complement each other and transform to propose whether kidney tonifying Yang medicine can be used in the treatment of dysmenorrhea. The purpose of treating dysmenorrhea is to make use of the warming and tonifying properties of traditional Chinese medicine such as dota seed and leek seed. In order to develop a significant effect of anti-dysmenorrhea drugs, but also for the treatment of dysmenorrhea drugs to provide a new direction, provide a reference for clinical medication.
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