# Analysis of the Laws and Characteristics of the Application of Fresh Drugs in "Puji Benshi Fang" Based on Data Mining

Shun Li, Guirong Liu*

(Institute of Literature and Culture of Traditional Chinese Medicine, Shandong University of Traditional Chinese Medicine, Jinan, 250300)

First author: Shun Li, E-mail: lishunchn@126.com
Corresponding author: *Guirong Liu, E-mail: lwy8668@163.com

**Abstract.** Based on data mining technology, the application rules and characteristics of fresh medicine in "Puji Benshi Fang" were discussed. Retrieve and collect the fresh medicine used in "Puji Benshi Fang" and the nature, flavor and chapters of the applied fresh medicine, analyze and input the data to establish a database. According to the data analysis, a total of 47 kinds of fresh medicines were used in"Puji Benshi Fang", 156 times, and ginger (Shengjiang) was the most frequently used fresh medicine. Among the 47 kinds of drugs used, the medicinal properties were the most cold, and the flavors were mostly bitter, sweet and spicy. In terms of clinical application, the most recipes containing fresh drugs were used in internal medicine, and the most fresh drugs were used in internal medicine. The data mining results showed that Xu Shuwei used fresh medicine mainly because fresh medicine was easy to obtain, easy to prepare, and the active ingredients remained intact. By summarizing the application of fresh medicine in "Puji Benshi Fang", we hope to strengthen the emphasis on fresh medicine and provide basis for clinical use of fresh medicine.

**Keywords:** Fresh medicine; Xu Shuwei; Puji Benshi Fang; data mining

## 1    Introduction

In recent years, the application range of big data mining and analysis has been expanding, and the application of big data mining technology in scientific research has become the mainstream trend, but the research on the combination of big data mining technology and traditional Chinese medicine classic literature is still in it s infancy. Traditional Chinese medicine has been inherited for thousands of years, leaving many great works to be studied. The combination of big data mining technology and traditional Chinese medicine classics can analyze and study medical works from a new Angle, which is conducive to solving the problem that scientific research data is difficult to analyze under the traditional mode. Traditional Chinese medicine works can be

studied in a short time and with high efficiency, which is convenient for clinical application and development. Make the excellent traditional Chinese culture glow with new brilliance in the new era.

Fresh Chinese medicine, mainly refers to the natural juice of fresh plant Chinese herbal medicine into medicine, or fresh animal or insect medicine into medicine to treat diseases. After the medicinal materials are harvested on time, the "original medicinal materials" are not processed[1,2] in any way that may cause changes or losses in the composition of the medicinal materials. Shennong Bencao Jing has recorded that fresh and dry medicinal products are different: "Medicinal products have five tastes of sour, salty, sweet, bitter and spicy, and four odors of cold, heat, temperature and cool, as well as poisonous and non-toxic, dry in the dark and violent, harvested at the time of month, raw and ripe, produced from the ground, true and false old and new, and each has its own method.[3]" The use of fresh medicine runs through the whole process of the development of medicine in China, and it is cheap, easy to obtain and effective.

Puji Benshi Fang was written by Xu Shuwei, a doctor in the Song Dynasty. The book is full of content, detailed in key points and clear in layers. This book is modeled after the style of a Mengchi's Poem for Benshi. The preface is "Collect the tried recipes and new ideas, record and pass it down to the world. It is entitled"Puji Benshi Fang"[4]. The book covered diseases including internal medicine, external medicine, women, children, trauma, five senses, acupuncture and moxibustion. It included 373 empirical prescriptions and recorded in detail the use of drugs in the prescriptions. Xu Shuwei paid great attention to fresh medicines. A large number of fresh medicines were used in his Puji Benshi Fang, including some pure fresh medicines. In this paper, the data mining of fresh medicines used in Puji Benshi Fang was carried out, and the characteristics of Xu Shuwei's use of fresh medicines were summarized, so as to provide ideas and enlightenment for the clinical application of fresh medicines at this stage.

## 2    Data collection

In order to reflect the representativeness and persuasion of the data, the inclusion and exclusion criteria were formulated for this data mining.

### 2.1    Inclusion criteria

Taking the whole book of Puji Benshi Fang as the object of data collection, and the first to the tenth volume of the book as the data source, the fresh medicines used in the whole book were built into a database.

### 2.2    Exclusion Criteria

(1) Excluding drugs in medical cases (2) excluding drugs in prescription theory (3) excluding drugs in addition and subtraction of evidence.

## 2.3      Data specification

The standard treatment of traditional Chinese medicine names is based on the 2020 edition of the Pharmacopoeia of the People's Republic of China (Volume 1). If the drugs are not included in the Pharmacopoeia of the People's Republic of China, the standard of Zhonghua Bencao is based on.

## 2.4      Criteria for judging fresh herbs

(1) Drugs directly indicated for raw use in Puji Benshi Fang, such as Chuanwu, Tiannanxing, etc.; (2) Herbs with the words "raw" and "juice", such as raw Wutou, raw Dihuang juice, raw Fuzi, etc.; (3) The herbs, such as Mugua and Pipa leaves, are described as fresh herbs, although they are labeled with the words "raw" and "juice" directly; (4) Animal medicines, such as Goat Kidney and Scorpion, without the processing method indicated, are regarded as raw; (5) Chinese herbs with different processing methods recorded in the Pharmacopoeia of the People's Republic of China, and not specifically specified in the Puji Benshi Fang, were not included in the statistics, such as Baizhu, Renshen, etc. (6) If different parts of the same Chinese medicine are used or there are different ways of using the same Chinese medicine, it will be classified as different drugs, such as raw Dihuang and raw Dihuang juice.

## 2.5      Statistics of data

The fresh drugs that met the labeling were input into Excel one by one to establish a database, and the Excel formula was used to describe the data.

# 3      Results

## 3.1      Frequency of application of fresh drugs in Puji Benshi Fang

According to the inclusion and exclusion criteria, 47 kinds of fresh medicines were found in the book, including 37 kinds of plant medicines and 10 kinds of animal medicines. The total number of fresh drugs was 156, including 145 for plant drugs and 11 for animal drugs. Among all the fresh drugs, 15 drugs appeared twice or more, among which ginger appeared most frequently (up to 57 times). Banxia was followed by 13 occurrences. Most of the animal drugs only appeared in the word, only sheep kidney appeared twice. The 15 fresh medicines that appeared repeatedly in order of frequency from large to small were: Shengjiang, Banxia, Jiang juice, Dihuang, Tiannanxing, Chuanwu, Zhuli, Dahuang, Dihuang juice, Qianniuzi, Congbai, Fuzi, Baifuzi, Gancao, Goat Kidney.The results are shown in Table 1.

Table 1. The frequency and frequency of application of 15 fresh medicines that appeared repeatedly in Puji Benshi Fang

| Ranking | Medications | Frequency | Frequency |
|---------|-------------|-----------|-----------|
| 1 | Shengjiang | 57 | 36.54% |
| 2 | Banxia | 13 | 8.33% |
| 3 | Jiang juice | 12 | 7.69% |
| 4 | Dihuang | 6 | 3.85% |
| 5 | Tiannanxing | 6 | 3.85% |
| 6 | Chuanwu | 5 | 3.21% |
| 7 | Zhuli | 4 | 2.56% |
| 8 | Dahuang | 3 | 1.92% |
| 9 | Dihuang juice | 3 | 1.92% |
| 10 | Qianniuzi | 3 | 1.92% |
| 11 | Congbai | 3 | 1.92% |
| 12 | Fuzi | 3 | 1.92% |
| 13 | Baifuzi | 2 | 1.28% |
| 14 | Gancao | 2 | 1.28% |
| 15 | Goat Kidney | 2 | 1.28% |

## 3.2 The nature and flavor of fresh medicine applied in Puji Benshi Fang

Among the 47 fresh medicines in the Puji Benshi Fang, 16 (34.06%) were cold, 13 (27.66%) warm, 11 (23.4%) flat, 4 (8.51%) hot and 3 (6.38%) cool. There were 19 (29.69%) drugs with bitter, sweet and spicy taste, 3 (4.69%) drugs with salty taste, 2 (3.13%) drugs with astringent taste, and only 1 (1.56%) drugs with light taste. The results are shown in Table 2 and 3, as well as Figure 1 and Figure 2.

Table 2. Classification of fresh medicines involved in Puji Benshi Fang

| Drug properties | Frequency | Frequency |
|-----------------|-----------|-----------|
| cold | 16 | 34.04% |
| hot | 4 | 8.51% |
| warm | 13 | 27.66% |
| cool | 3 | 6.38% |
| flat | 11 | 23.40% |

Table 3. Classification of fresh medicines involved in Puji Benshi Fang

| Flavor of medicines | Frequency | Frequency |
|---------------------|-----------|-----------|
| acid | 1 | 1.56% |
| bitter | 19 | 29.69% |
| sweet | 19 | 29.69% |
| spicy | 19 | 29.69% |
| salty | 3 | 4.69% |

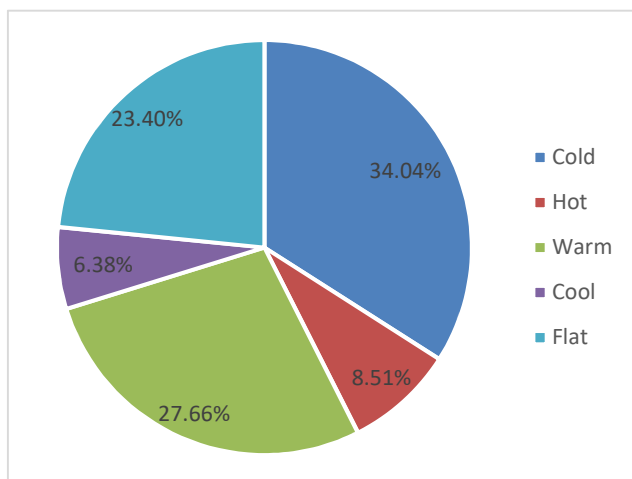| light | 1 | 1.56% |
| astringent | 2 | 3.13% |



**Fig. 1.** Distribution of fresh drugs involved in Puji Benshi Fang
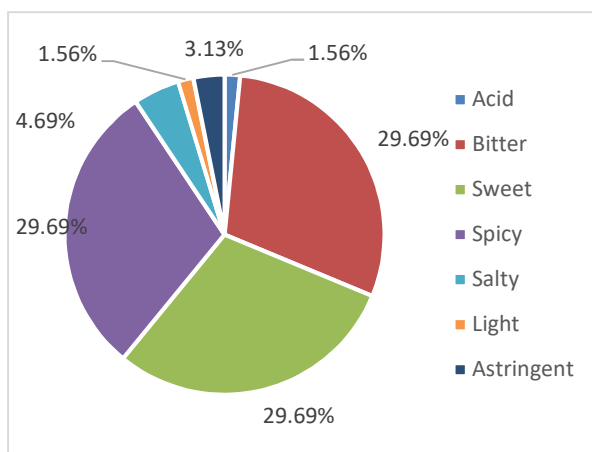


**Fig. 2.** The distribution of fresh medicines involved in the Puji Benshi Fang

## 3.3    Rules of clinical application of fresh medicines in Puji Benshi Fang

The whole book consists of 10 volumes, and there are 27 chapters using fresh medicines, involving internal medicine, external medicine, women's medicine and children's medicine. Among them, 90 prescriptions using fresh medicines in internal medicine were the most, accounting for 86.54% of the total prescriptions. The second was surgery, with 8 prescriptions, accounting for 7.69% of the total number of prescriptions. Then there were 4 prescriptions in gynecology, accounting for 3.85% of the

total number of prescriptions. There were 2 pediatric prescriptions, accounting for 1.92% of the total number of prescriptions. There were 5 pure fresh prescriptions: Ersheng San, Dingfeng Bing, Shexiang Yuan, Sansheng Yuan and Huatan Yuan, all of which were internal medicine prescriptions. The results are shown in Figure 3 and Table 4, Table 5.
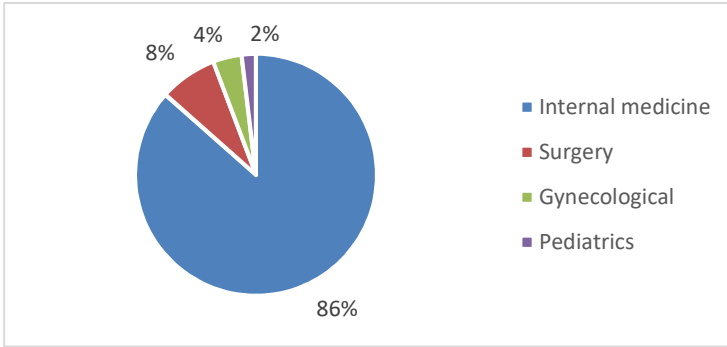


**Fig. 3.** Distribution of clinical application of fresh medicines in Puji Benshi Fang

**Table 4.** Statistics of indications for fresh prescriptions in Puji Benshi Fang

| Division of Departments | Main indications | Frequency | Frequency |
|---|---|---|---|
| Internal medicine | Stroke, liver, gallbladder, muscle and bone all winds | 16 | 15.38% |
| | Heart, small intestine, spleen and stomach disease | 3 | 2.88% |
| | Lung and kidney disease | 5 | 4.81% |
| | Supplement deficiency fatigue | 1 | 0.96% |
| | Headache and dizziness | 4 | 3.85% |
| | Wind-cold dampness and limb joint disease | 4 | 3.85% |
| | Wind, phlegm, cough | 6 | 5.77% |
| | Accumulation, stagnation, hiccups | 4 | 3.85% |
| | Bladder, hernia, small intestine, seminal leakage diseases | 2 | 1.92% |
| | Out of chapter | 1 | 0.96% |
| | Nausea, vomiting, cholera | 5 | 4.81% |
| | Diarrhea, dysentery disease | 3 | 2.88% |
| | Wind-hot, pharynx, dizziness disease | 4 | 3.85% |
| | Edema disease | 1 | 0.96% |
| | Kidney and foot, knee, waist, leg, beriberi disease | 5 | 4.81% |

| | | | |
|---|---|---|---|
| | Out of chapter | 2 | 1.92% |
| | Hemorrhoids, anal fistula disease | 2 | 1.92% |
| | Bleeding, hematemesis, hemoptysis | 2 | 1.92% |
| | All cough, weak sweating, diabetes | 4 | 3.85% |
| | Abdominal, hypochondriac pain | 1 | 0.96% |
| | Out of chapter | 1 | 0.96% |
| | Typhoid epidemic | 12 | 11.54% |
| | Typhoid epidemic | 2 | 1.92% |
| Surgery | Concern eyes, face, mouth, nose, tongue, lips and ears | 2 | 1.92% |
| | Skin herpes and traumatic injury | 6 | 5.77% |
| Gynecology | Diseases of women | 4 | 3.85% |
| Pediatrics | Pediatric diseases | 2 | 1.92% |

**Table 5.** Commonly used fresh drugs for different types of diseases

| Division of Departments | Drugs | | Frequency |
|---|---|---|---|
| Internal medicine | Shengjiang | 52 | |
| | Banxia | 13 | |
| | Jiang juice | 10 | |
| | Tiannanxing | 5 | |
| | Chuanwu | 4 | |
| | Zhuli | 4 | |
| | Dahuang | 3 | |
| | Fuzi | 3 | |
| | Qianniuzi | 3 | |
| | Dihuang | 3 | |
| | Raw Dihuang juice | 3 | |
| | Baifuzi | 2 | |
| | Goat Kidney | 2 | |
| | Baifuling | 1 | |
| | Caowutou | 1 | |
| | Chuanjiang | 1 | |
| | Chuanxiong | 1 | |
| | Ciweipi | 1 | |
| | Congbai | 1 | |
| | Dilong | 1 | |
| | Gancao | 1 | |

| | | |
|---|---|---|
| | Dog bile (Goudanzhi) | 1 |
| | Heidou | 1 |
| | Huangqin | 1 |
| | Jiziqing | 1 |
| | Jiyu | 1 |
| | Jiyudan | 1 |
| | Jingli | 1 |
| | Maimendoong | 1 |
| | Mugua | 1 |
| | Pipaye | 1 |
| | Scorpion | 1 |
| | Roudoukou | 1 |
| | Raw Bohe | 1 |
| | Raw Ge juice | 1 |
| | Raw Rougui | 1 |
| | Raw Honey (Fengmi) | 1 |
| | Raw Weirui | 1 |
| | Tianma | 1 |
| | Yinchen | 1 |
| | Zhangnao | 1 |
| | Bile of pig（Zhudanzhi） | 1 |
| | Pig's kidney（Zhuyao） | 1 |
| | | |
| | Raw Dihuang | 2 |
| | Shengjiang | 2 |
| | Caojueming | 1 |
| | Gancao | 1 |
| Surgery | Jiang juice | 1 |
| | Raw Aiye | 1 |
| | Raw Longnao | 1 |
| | Raw Ou juice | 1 |
| | Tiannanxing | 1 |
| | | |
| | Shengjiang | 3 |
| Gynecology | Congbai | 2 |
| | Raw Dihuang | 1 |
| | | |
| Pediatrics | Chuanwu | 1 |
| | Jiang juice | 1 |

# 4 Summary of the application characteristics of fresh herbs in Puji Benshi Fang

Puji Benshi Fang has a wide range of sources and kinds of fresh medicines, and most of them are local medicinal materials, which are easy to obtain. A total of 47 kinds of fresh medicines were involved in the Puji Benshi Fang, including 10 kinds of animal medicines and 37 kinds of plant medicines. Among them, Shengjiang, Banxia, Dihuang and Congbai are common native medicinal materials, which are easy to obtain and widely used. In addition, there are several kinds of medicines in the book, including Shengjiang and Jiang juice, Chuanjiang, raw Dihuang and raw Dihuang juice. Different forms of medicines are selected according to different needs, which fully reflects the simplicity of using fresh medicines. In terms of the use of animal fresh medicine, most of them are obtained from the viscera of common livestock and insect drugs, which are relatively easy to obtain. In addition, a total of 5 prescriptions are composed of fresh medicine, which are Ersheng San (Fuzi, Shengjiang, Tiannanxing), Dingfeng Bing (Tianma, Chuanwu, Tiannanxing, Banxia, Chuanjiang, Chuanxiong, Baifuling, Gancao, Jiang juice), Shexiang Yuan (Chuanwu, Scorpion, Heidou, Dilong), Sansheng Yuan (Banxia, Tiannanxing, Baifuzi, Shengjiang), Huatan Yuan (Banxia, Jiang juice), Less medicinal flavor reflects that Xu Shuwei fully considered the use environment of prescription, and used fresh medicine flexibly.

## 4.1 Analysis of the application of fresh medicinal properties and flavors in Puji Benshi Fang

The cold and cool nature of fresh herbs is cooler than that of dry ones. In the Puji Benshi Fang, fresh herbs are used for their cool and moisturizing properties, and Zhuli and raw Dihuang juice are mostly used in Zhuli decoction, Fangji decoction, Mugua decoction, etc., to revive the body and reduce fever. According to the theory of traditional Chinese medicine, bitterness can be discharged, dryness can be firm, sweetness can be replenishedand slow, and xin can be scattered, Xu Shuwei used these three properties to treat the acute syndrome, blood syndrome and surface syndrome, such as the Dingfeng Bing. In the book, this recipe was used to treat the external wind and evil spirits in the Yang meridian, and the symptoms of mouth and eye deviation, excessive phlegm and salivation, aversion of body heat and cold, and body rigidity. The symptoms of this disease are sudden onset, and it starts from the stagnation of wind and pathogenic factors in the Yang meridian. It is an acute syndrome and a surface syndrome. The flavors of this disease are spicy and bitter, Baifuling and Gancao are sweet, Banxia, Shengjiang, Gancao and Chuanxiong are spicy, with bitter herbs to relieve the essence and dry phlegm dampness, spicy herbs to dissipate the surface, and sweet herbs to strengthen the body In addition, the active ingredients of acarcinate drugs are mainly related to the volatile oil, which is easily lost after processing, and the active ingredients can be retained[5] to the maximum extent by using fresh products.

## 4.2    Analysis of the clinical application of fresh medicines in Puji Benshi Fang

Fresh medicines are widely used in Pu Ji Benshi Fang. It can be seen from Tables 5 and 6 that Xu Shuwei mainly used fresh medicines in internal medicine in Puji Benshi Fang. In terms of the frequency of use of diseases in various departments, the high-frequency drugs such as Shengjiang, Banxia, Dihuang, Shengjiang juice and so on were easy to obtain. For internal diseases, the number of prescriptions containing fresh medicines was up to 16 in "Stroke, liver, gallbladder, muscle and bone all winds" and 14 in "Typhoid epidemic". "Stroke, liver, gallbladder, muscle and bone all winds" is an emergency. At this time, it is necessary to emphasize the characteristics of easy availability and simple preparation, so the use of fresh medicines to directly take and attack the disease, and the use of fresh medicines in the treatment of "cold pathogenic epidemic" is to highlight the characteristics that the active ingredients of fresh medicines are more intact and the effect is more powerful.

## 5    Conclusion

Application of fresh medicine has a long history, the earliest writing unearthed in changsha recorded in "fifty-two diseases party": "the first party which anal fistula take Shuyu 2 litres, Shuyu juice two bucket with stains, thought pulp, drink[6]", to the Ming and Qing dynasties, Xue shengbai, Wu Jutong warm disease school doctor to fresh medicine used to reach the top[7]. Compared with dry medicine, fresh medicine does have advantages[8] in clinical effect, Fresh medicine with its characteristics of moist, thick taste, pure juice and other outstanding, compared with dry medicine in the treatment of emergency, surface syndrome, heat syndrome, miscellaneous diseases and other diseases significantly[9]. The content of volatile oil, sugar, flavonoids, phenols, saponins and other active ingredients in fresh medicine is high [10]. But it is not easy to preserve, lack of stable supply channels, application of a single dosage form and other problems are less used by doctors. With the continuous improvement of patients' demand for traditional Chinese medicine to treat diseases, we should make full use of modern science and technology, and strive to solve the problems of fresh medicine in preservation and application. We should make full use of modern science and technology to solve the problems of preservation and application of fresh medicine. The so-called use of fresh medicine in Puji Benshi Fang is one of the documents. We should continue to excavate the traditional Chinese medicine literature, and strive to further improve the diagnosis and treatment of traditional Chinese medicine.

## Acknowledgements

# References

1. Zhang X., Miao Y.Y., Miao M.S. (2019) Modern application and research of fresh herbs of traditional Chinese Medicine. Journal of Traditional Chinese Medicine,34(05): 1030-1033. doi: 10.16368/j.issn.1674-8999.2019.05.244.
2. Peng M.F., Tian S., Miao J.X., et al. (2021) Application, problems and future development of fresh traditional Chinese medicine. Journal of Chinese Medicine,62(14): 1200-1204. DOI:10.13288/j.11-2166/r.2021.14.002.
3. Wu P. et al. Sun X.Y., Sun F.Y. (1991) Shennong's Materia Medica Classic. Shanxi Science and Technology Press, Taiyuan.
4. Xu S. (2007) Puji Benshi Fang. China Traditional Chinese Medicine Press, Beijing.
5. Zhang M., Zhu W.X., Gan G.X., et al. (2019) Research on the preservation of fresh medicine containing volatile components. Science and Technology of Light Industry, 35(07):31-32+55.
6. Zhang L. (2017) Summary Notes of Wu Shi er bing Fang (Prescriptions for Fify-two Diseases) in silk scrolls from the Han tomb of Mawangdui. Ancient Chinese Medical Books Press, Beijing.
7. Guo X.Y., Du J. (2015) Exploration of the advantages of fresh medicine in clinical application. Chinese Journal of Clinicians,43(09):91-93.
8. Li Y., Guo H., Miao M.S. (2019) Pharmacology and clinical application analysis of fresh use of traditional Chinese medicine. China Journal of Traditional Chinese Medicine and Pharmacy,34(12):5691-5695.
9. Peng M.F., Tian S., Miao J.X. et al. (2021) Application, existing problems and future development of fresh Chinese medicine. Journal of Chinese Medicine,62(14):1200-1204. DOI:10.13288/ J.11-2166 /r.2021.14.002.
10. Zhang Y.L., Chen X.L., Mei Q.X. et al. (2017) Chinese herbal fresh general situation of the chemical composition and pharmacological activity research. Journal of traditional Chinese medicine, 40 (10): 2483-2487. DOI: 10.13863 / j.i ssn1001-4454.2017.10.057.