Article

Discussion on the medication rules for treating arthralgia syndrome in three famous medical records based on data mining

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Abstract: Objective: To explore the regularity of medication in the treatment of arthralgia syndrome in three "Famous Medical Records". Systematically explore the rules of drug use in the treatment of BI syndrome, to provide new ideas and theoretical support for modern TCM clinical treatment of Bi syndrome. **Method:** Using three "Famous Medical Records" as the source of literature, medical records for treating arthralgia syndrome were collected, and a database was established using Excel, IBM SPSS Modeler, and IBM SPSS Statistics software. Drug use, association rules, and drug clustering were analyzed. **Result:** 323 medical records and 650 prescriptions involving 429 traditional Chinese medicines were collected. The drugs with higher frequency of use include Angelica sinensis, Poria cocos, licorice, cinnamon twig, etc., among which the drugs are mostly drugs for tonifying deficiency and eliminating wind and dampness; The main drug properties are temperature; The medicinal taste is mostly sweet, bitter, and pungent; Drugs are mostly attributed to the liver, spleen, and kidney channels. Common drug compatibility combinations include: Angelica-Chuanxiong, Angelica-Lycium barbarum, etc. A total of 5 drug combinations were obtained through cluster analysis. **Conclusion:** Through data mining, it is found that the treatment of arthralgia syndrome in the three "Famous Medical Cases" focuses on reinforcing deficiency and balancing deficiency with reality. Multi use blood tonic drugs, Qi tonic drugs, and warming drugs that can eliminate rheumatic arthralgia, to tonify, unblock collaterals, and eliminate arthralgia, achieving the effect of Qi and blood homeostasis; Reuse wind medicine to treat rheumatism together; Be good at using animal drugs, especially insect drugs, to strengthen the health and eliminate pathogenic factors.

Keywords: famous medical cases; data mining; arthralgia syndrome; aedication pattern

Bi syndrome refers to the syndrome that the meridians of the limbs are blocked by wind, cold, dampness and heat, leading to Qi and blood, meridians, pain, pain, numbness, numbness, weight, burning, flexion and extension, or even enlargement and deformation of the joints as the main clinical manifestations [1], The course of the disease is progressive and sticky. Similar to rheumatoid arthritis, rheumatoid arthritis, ankylosing spondylitis, gout and other diseases in western medicine. At present, western medicine lacks specific means in the treatment of arthralgia, most of which can only relieve symptoms but not prevent the development of the disease, and it is easy to relapse after stopping the drug. However, the treatment of arthralgia in traditional Chinese medicine has great advantages in reducing the pain of patients, controlling the development of the disease and alleviating the side effects of drugs. Therefore, it is of practical significance to seek for effective TCM treatment methods.

"Doctor class case" "continue doctor class case" two continue doctor class case "three books are our medical history large medical case monographs, although under

different time background, but brings together a lot of temporary medical case, its content according to the disease classification, has valuable literature value, clinical research of traditional Chinese medicine played a huge guiding role, have a profound impact on clinical treatment of diseases. At present for three rules of the medical class treatment disease medication research, but not on the basis of all medical case of bi syndrome medication data mining research, so the study with the medical class case "continued medical class case" the second continued medical class case "as the data source, data mining, summarizes the treatment of bi syndrome medication, in order to provide new ideas for clinical treatment.

1. Source

"Famous Doctor Case" and "Continuing Famous Doctor Case" were taken as the search source for "Bi syndrome", "Bi syndrome", "Bi syndrome", "Bi Festival" and "Continuing Famous Doctor Festival"; and the search results and the chapters of "Bi syndrome" and "calendar disease" in "Second Continuing Famous Doctor Case" were taken as the data source.

1.1. Inclusion and exclusion criteria

1.1.1. Inclusion criteria

(1) It meets the criteria of bi syndrome differentiation in the Guidelines for diagnosis and Treatment of Common Diseases in Internal Medicine;

(2) Complete selection of medical plans and prescriptions.

1.1.2. Exclusion criteria

(1) The prescription is incomplete and there is no clear composition of the drug;

(2) Prescription with acupuncture, external application, fumigation and washing therapy to obtain the effect;

(3) Clearly record that no effective prescription is obtained;

(4) Prescription of other diseases other than arthralgia syndrome in the process of diagnosis and treatment.

1.2. Data extraction and input

There are 3 bi syndrome medical cases with 6 prescriptions; 54 medical cases and 89 prescriptions; 266 medical cases and 555 prescriptions. A total of 323 medical cases and 650 prescriptions. Establish the Excel database.

1.3. Data specification

Reference to the Pharmacopoeia of the Peoples Republic of China (Edition 2020) [2], The name of traditional Chinese medicine in the prescription should be standardized, such as atractylodes, coix seed, coix seed and coix, and Epimedium, etc.

1.4. Data analysis method

In this study, in order to comprehensively and thoroughly analyze the medication data collected from the "Famous Doctor's Class Cases", "Continuing

Famous Doctor's Class Cases" and "Second Continuing Famous Doctor's Class Cases" for the treatment of paralysis, a comprehensive data analysis strategy with multi-software synergy and multi-methods combination was adopted to ensure the scientific and reliable results of the study. The comprehensive data analysis strategy of software synergy and multi-methods combination was adopted to ensure the scientificity and reliability of the research results.

In the preliminary data processing stage, the powerful data processing function of Excel software was fully utilized. For the 650 prescriptions involved, detailed screening and statistical analysis were carried out in terms of frequency, efficacy, flavor and dosage, and other key dimensions. In particular, for the frequency statistics, a frequency threshold of 75 times and above was set to focus on Chinese medicines that appeared frequently in a large number of prescriptions. This screening criterion helps to quickly focus on the drugs that are frequently used in clinical practice, and initially outline the core group of drugs used in the treatment of paralysis, which provides important basic data support for the subsequent in-depth analysis.

The mining of drug association rules is realized with the Apriori algorithm in IBM SPSS Modeler 18.0 software. In the algorithm parameter setting process, after repeated pre-tests and expert verification, the minimum conditional support degree is determined to be 6%. The setting of this parameter ensures that the mined drug combinations have a certain degree of universality and representativeness in the whole dataset, avoids excessive chance association combinations due to too low support, and ensures the validity of the research results. The confidence level of the minimum rule is set to 80%, which requires that the association rules found have a high degree of confidence, i.e., when a drug appears, another drug associated with it has a high probability of concomitant appearance to a certain extent, which strongly enhances the reliability of the association rules. At the same time, the maximum number of antecedents is set to 4, which controls the complexity of the association rules and ensures that drug combinations with practical clinical significance and interpretability can be mined, and prevents the rules from being too complex and difficult to understand and apply due to the excessive number of antecedents. The Lift degree is set to 1 to further filter out the association combinations with practical application value and ensure that the obtained drug association relationships are statistically and clinically significant. The algorithm provides a comprehensive and in-depth association analysis of all the drugs in the prescription, accurately revealing the potential synergistic effects and compounding laws between the drugs, and providing a strong basis for an in-depth understanding of the mechanism of drug combinations in the treatment of paralysis.

In the drug cluster analysis, IBM SPSS Statistics 29.0 software was used to analyze the high-frequency drugs (frequency of use ≥ 75) as the research object. In the process of cluster analysis, multiple attributes of the drugs were considered, including but not limited to the similarity of efficacy, flavor, and categorization. Through advanced clustering algorithms, drugs with similar characteristics were grouped into the same class. This analysis method can reveal the intrinsic connection between drugs and potential medication patterns at the macro level, which helps to discover the synergistic effect and unique status of different drug classes in the

treatment of paralysis, providing clinicians with new ideas and reference frameworks in selecting drug combinations and formulating personalized treatment plans, and further promoting the scientific and standardized process of the treatment of paralysis in Chinese medicine.

Through the above series of rigorous and scientific data analysis methods, the collected data on the use of medication for paralysis from different perspectives are deeply mined and systematically analyzed to ensure that the law of medication for the treatment of paralysis can be comprehensively and accurately revealed, and that the data can provide solid data support and scientific basis for the clinical practice and theoretical research of Chinese medicine.

2. Results

2.1. Statistics of medication frequency

Statistics were made on the frequency of 650 prescription drugs for the treatment of "Famous doctor Cases", "Continuing famous doctor Cases" and "Second Renewal of famous doctor Cases", and 429 drugs appeared, a total of 8424 times. Among them, 75 times of occurrence or more drugs, a total of 4087 times. The following are the top ten drugs with the highest frequency: angelica, poria, licorice, cassia branch, gentiana macrophylla, achyranthes bidentata, coix seed, white peony root, atractylodes, mulberry branch. Statistics of drugs using frequency 75 are shown in **Table 1**.

Table 1. Statistics on the frequency of prescription of three famous doctor cases.

Medicinal	Frequency/Times	Frequency	Medicinal	Frequency/Times	Frequency
angelica	345	4.10%	papaya	108	1.28%
poria	291	3.45%	monkshood	107	1.27%
liquorice	216	2.56%	ledebouriella root	101	1.20%
cassia branch	212	2.52%	prepared rehmannia root	97	1.15%
gentiana macrophylla	189	2.24%	phellodendron amurense bark	95	1.13%
achyranthes bidentata	186	2.21%	radix rehmanniae	94	1.12%
coix seed	183	2.17%	rhizoma chuanxiong	93	1.10%
white peony root	177	2.10%	notopterygium root	90	1.07%
atractylodes	173	2.05%	atractylodes lancea rhizome	84	1.00%
mulberry branch	163	1.93%	teasel root	84	1.00%
the root of fangji	126	1.50%	safflower	81	0.96%
angelica pubescens	124	1.47%	taxillus chinensis	80	0.95%
astragalus mongholicus	124	1.47%	eucommia bark	78	0.93%
tangerine peel	122	1.45%	millettia dielsiana root-bark	78	0.93%
pinellia tuber	111	1.32%	wolfberry fruit	75	0.89%

It can be intuitively seen from **Table 1** that these high-frequency drugs occupy an important position in the medical record prescriptions for the treatment of BI syndrome, reflecting their extensive application in clinical practice and providing basic data for the follow-up investigation of drug use rules.

2.2. Classification statistics of drug efficacy

Refer to Traditional Chinese Medicine Pharmacy (the textbook of the 13th Five-Year Plan of National Higher Education in Traditional Chinese Medicine industry) [3] High-frequency drugs (frequency 75) can be divided into 10 categories according to efficacy, among which the first two categories of drugs with high frequency are deficiency drugs and wind dampness drugs, and most of the deficiency drugs are blood tonic and Qi tonic drugs. See **Table 2**.

Table 2. Classification statistics on the efficacy of internal prescription in three famous doctor cases.

Drug category	Taste number	Frequency/Times	Frequency
fill the virtual medicine	10	1558	38.12%
medicine for rheumatism	6	679	16.61%
drugs for relieving exterior syndrome	3	403	9.86%
drug for invigorating blood circulation and eliminating stasis	3	360	8.81%
heat-clearing drug	2	189	4.62%
diuretics for eliminating dampness	2	474	11.60%
air medicine	1	122	2.99%
drugs for dispelling internal cold	1	107	2.62%
apophlegmatisant	1	111	2.72%
moisturizing medicine	1	84	2.06%

The statistical results show that in the treatment of paralysis, tonifying the deficiency and dispelling wind-dampness are important medication ideas. The drugs for tonifying the deficiency can support the health qi, and the drugs for dispelling wind-dampness can get rid of the disease-causing evils, which are complementary to each other, reflecting the concept of Chinese medicine that focuses on supporting the positive and dispelling the evils, and providing the basis for further analyzing the law of medication at the level of efficacy.

2.3. Statistics of drug consumption and taste

2.3.1. Statistics of drug use and taste

According to the Pharmacopoeia of the Peoples Republic of China (2020 edition), the medicinal properties and flavor of 30 high-frequency drugs (75 frequency) were analyzed and counted. The results showed that the medicinal properties of the three "Famous Doctor Cases" were mainly warm, and the flavor were mostly sweet, bitter and spicy. See **Figures 1** and **2**.
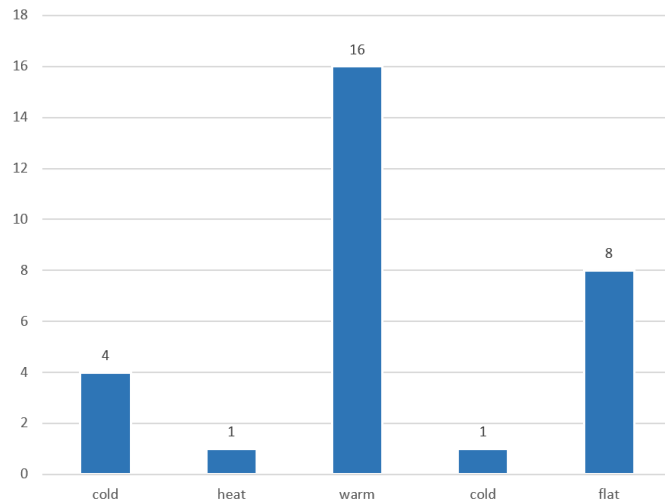
Figure 1. Three "famous doctor cases" in the treatment of Bi syndrome drug statistics.
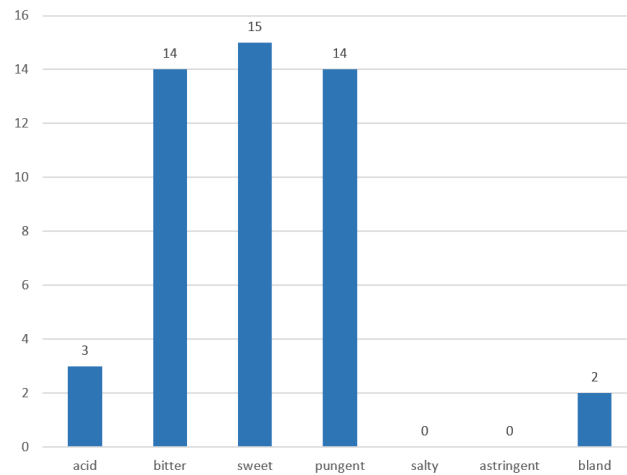

Figure 2. Three "famous doctor class case" treatment of Bi syndrome drug taste statistics.

Warm drugs have the effect of warming the meridians and dispersing cold and evil, sweetness can tonify, harmonize and slow down, bitterness can drain and dry, and pungency can disperse and move. The combination of these flavors of the drugs used, and paralysis mostly due to wind, cold, dampness and evil attack, healthy qi deficiency of the etiology of the disease, from the flavor point of view reflects the law of medication.

2.3.2. Statistics of drug use

According to the Pharmacopoeia of the Peoples Republic of China (2020 edition), the prescription of high frequency drugs (use frequency 75) was statistically analyzed, and it can be found that more drugs were attributed to the liver meridian, followed by the spleen meridian and kidney meridian. See **Figure 3**.
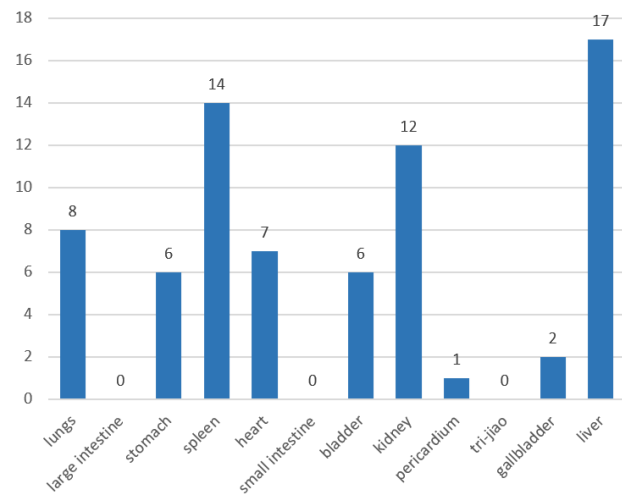
Figure 3. Three "famous doctor cases" for the treatment of Bi syndrome drugs according to the statistics.

The liver governs the tendons, the spleen governs the muscles, and the kidneys govern the bones. Bi syndrome is mainly characterized by symptoms such as pain in the limbs and joints and difficulty in flexion and extension, which are closely related to tendons, bones and muscles. Most of the drugs are attributed to the liver, spleen and kidney meridians, indicating that in the treatment of Bi syndrome, emphasis is placed on regulating the functions of the zang-fu organs through these three meridians to achieve the purpose of treating the disease.

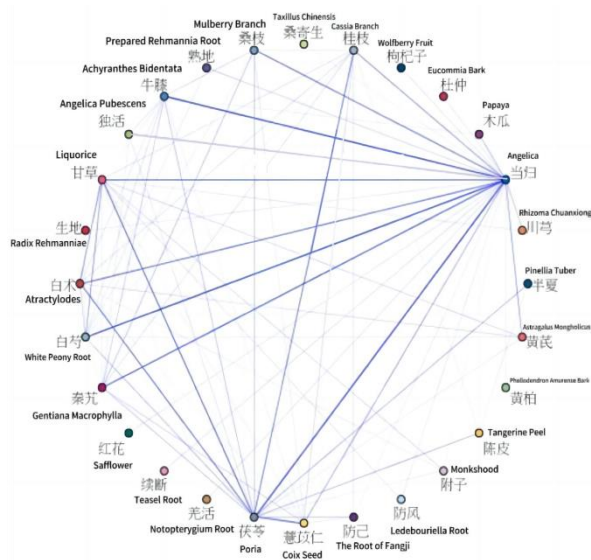## 2.4. Analysis of medication association rules

Figure 4. Three network diagram of high-frequency drug relationship for the treatment of Bi syndrome in famous doctor cases.

Using the Apriori algorithm in SPSS Modeler 18.0, Set a minimum conditional support level of 6%, Minimum rule confidence of 80%, Maximum number of preceding items = 4, Lift degree of 1, Association analysis of all the drugs included in the prescription, Obtained three "famous doctor cases" for the treatment of bi

syndrome drug combination of 61. In addition, the high frequency drugs (used frequency 75) are used as the drug correlation network map, and the connection strength is expressed by line segment thickness. In the network diagram, the line segment thickness indicates strong correlation, while the thin line segment indicates weak correlation. See **Figure 4**.

The network diagram can visually show the correlation between drugs. For instance, Angelica sinensis is at the core of the correlation network and has compatibility with many drugs, which provides important clues for studying the synergistic effects of drugs and optimizing prescriptions.

2.5. High-frequency drug cluster analysis

For the cluster analysis of 30 high frequency drugs (using frequency 75), the high frequency drugs can be divided into 5 cluster combinations by tree graph. See **Table 3**, **Figure 5**.
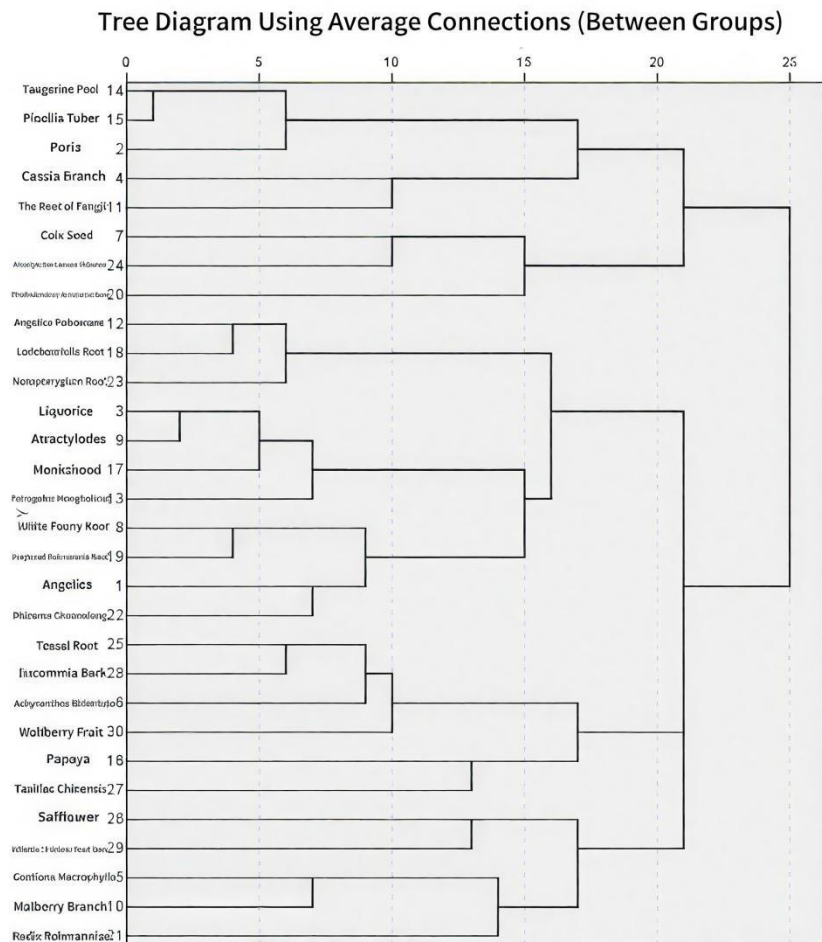

Figure 5. Cluster analysis diagram of high-frequency drugs in the treatment of Bi syndrome in three famous medical cases.

Table 3. Results of the high-frequency drug cluster analysis.

Classify	Traditional Chinese medicine taste number	Specific drugs
I	5	tangerine peel, pinellia tuber, poria, cassia branch, the root of fangji
II	3	coix seed, atractylodes lancea rhizome, phellodendron amurense bark
III	11	angelica pubescens, ledebouriella root, notopterygium root, liquorice, atractylodes, monkshood, astragalus mongholicus, white peony root, prepared rehmannia root, angelica, rhizoma chuanxiong
IV	6	teasel root, eucommia bark, achyranthes bidentata, wolfberry fruit, papaya, taxillus chinensis,
V	5	safflower, millettia dielsiana root-bark, gentiana macrophylla, mulberry branch, radix rehmanniae

These clustered combinations reflect the similarity and synergism of different drugs in terms of efficacy, flavor, and categorization, which provide valuable references for clinical medication and help to select appropriate drug combinations according to the specific conditions of patients.

3. Discussion

The three medical case books, "Famous Doctors' Cases", "Continuation of Famous Doctors' Cases", and "Second Continuation of Famous Doctors' Cases", can be regarded as brilliant pearls in the treasure trove of clinical literature in traditional Chinese medicine. They extensively contain clinical medical cases from numerous physicians spanning thousands of years from the pre Qin period, through the Qin, Han, Tang, Song, Yuan, Ming, and Qing dynasties, to the early years of the founding of the People's Republic of China [4]. Its content is rigorously arranged according to disease classification, with detailed records ranging from common illnesses to difficult and complicated diseases.

Throughout the long course of history, medical professionals from different periods have utilized their abilities to continuously inject new content into these medical case databases [5]. This results in a large number of medical cases covered by the three medical cases, reflecting not only the medical characteristics of different eras, but also the inheritance and development of clinical experience in traditional Chinese medicine. After long-term accumulation and precipitation, they have gradually formed a relatively independent and complete medical record system.

It is worth noting that the three medical cases have particularly rich records of the treatment of Bi syndrome. These records gather valuable experience from medical professionals throughout history in treating Bi syndrome. Compared to modern medicine's treatment methods for Bi syndrome, they demonstrate distinct characteristics in terms of medication. Ancient medical practitioners used various natural medicinal herbs flexibly based on the medical theory and clinical practice at that time. Their medication approach focused on both overall regulation and individual differences.

Based on the in-depth mining results of a large amount of data from the three medical cases mentioned above, a detailed analysis will be conducted from the aspects of etiology and pathogenesis, medication characteristics, and exploration of new formulas, in order to provide new perspectives and ideas for a deeper

understanding of traditional Chinese medicine treatment of Bi syndrome.

3.1. Etiology and pathogenesis of Bi syndrome

A total of 323 medical cases were included in the study. Through the classification of drug efficacy, drug properties, drug flavors, and meridian analysis, it was found that most of the drugs belong to tonifying deficiency drugs and dispelling wind and dampness drugs; The medicinal properties are mainly warm, and the medicinal flavors are mostly sweet, bitter, and spicy; Medications are mostly classified into the liver meridian, spleen meridian, and kidney meridian. From this data, it can be inferred that the Bi syndrome is related to the liver, spleen, and kidneys. Diseases often exhibit cold symptoms, and the disease is caused by the infection of evil Qi on the basis of insufficient positive Qi. The main pathogenesis is weak liver, spleen, and kidney deficiency, and blocked meridians.

The three books of "Famous Doctors' Cases" discuss the close relationship between the occurrence of Bi syndrome and the liver, spleen, and kidney, such as "The three pathogenic factors of wind, cold, and dampness correspond internally to the three zang—organs of the liver, kidney, and spleen. It is only when the healthy Qi of the liver, kidney, and spleen is insufficient that wind, cold, and dampness can penetrate deeply and cause bi-syndrome. Therefore, the key to treating bi-syndrome is always to prioritize strengthening the healthy Qi and secondarily to expel pathogenic factors [6]. "The liver mainly stores blood, and its relationship with tendons in the body is very close. The liver Qi is abundant, the blood flow is unobstructed, and it nourishes the muscles and meridians. If the liver is depressed and the Qi is deficient, the Qi that is generated cannot be infused into the meridians. If there is a sudden sensation of external evil, the blood vessels will be stagnant and blocked, and if there is no blockage, it will cause pain. The spleen is the foundation of postnatal development and controls the muscles. Spleen deficiency leads to weak movement of water, grains, and essence, resulting in the accumulation of phlegm. The limbs and bones lack the nourishment of essence, muscles are not abundant, and pain occurs when they are not prosperous. The two main causes of pain in traditional Chinese medicine are pain caused by blocked meridians in the human body [7] and pain caused by nutrient deficiency in the body [8]. The kidney is the foundation of innate nature, and it controls the bone and generates marrow. Lack of innate endowment, low function of organs and tissues, and obstruction of meridians when encountering wind, cold, dampness, heat and other pathogens; If there is a loss of balance between work and rest, and internal consumption of kidney Qi, then both Qi and blood are deficient, and the bone marrow cannot be nourished, leading to joint and bone deformities, swelling and pain. This is consistent with the current basic understanding of the location, etiology, and pathogenesis of Bi syndrome.

Based on the above profound understanding of the etiology and pathogenesis of paralysis, medical practitioners of all generations have summarized a series of medication features that are compatible with it in their long-term clinical practice, which will be discussed one by one below.

3.2. Pay attention to supplementing deficiency and balancing reality and virtuality

In the three "Famous doctor Cases", deficiency medicine and wind dampness medicine are mostly used in the treatment of bi syndrome. It can be seen that the treatment of Bi syndrome pays more attention to deficiency, so that the treatment of deficiency and evil factors are combined, rather than blindly using attack and severe drugs. Many doctors have related, such as Ren Xiandou medical case mentioned in a patient, arm swelling pain, especially at night, use scattered cold wind drugs not effect, turned to Ren Xiandou, Ren Xiandou words: " the doctor of cure, only attack evil, medicine of evil, support, only shares cut, damage vital Qi, is I win the weak, and eager to kill the enemy also... cure this only appropriate culture essence gas, essence gas is sufficient, can by hip bone deep dive wet out of also [6]." Not only the wind cold and dampness bi pay attention to the repair of healthy Qi, rheumatism heat bi also need to repair the first: "liver rheumatism fever, stay meridians, bi pain night. This internal cause of the disease, should not be steep, attack the wind and rob phlegm, and then hurt the blood. Must prevent blood loss and mutilation, or bi in the soil and abdominal distension. When nourishing liver Yin, with blood stasis pain [6]." From the medical case and related discussion, we can see that the fundamental occurrence of bi syndrome lies in the innate deficiency of positive Qi, wind, cold, wet, heat and other evil invasion. In the personal blood with the gas, the blood is false is timid, evil is blood resistance. In addition, Lin Peiqin also made a similar statement in "Lei Zheng Zhi Cai": All types of bi syndromes are mainly due to the prior deficiency of ying and wei Qi, with the interstices of the skin not being tight. Wind, cold, and dampness invade the body interior taking advantage of the deficiency. The healthy Qi is blocked by the pathogenic factors and cannot circulate properly. As a result, it stagnates, the Qi and blood congeal and become sluggish, and over time, bi syndrome is formed [9]. From medical cases and related discussions, it can be seen that the fundamental cause of Bi syndrome lies in the deficiency of innate positive Qi, and the invasion of pathogenic factors such as wind, cold, dampness, and heat while taking advantage of the deficiency. Blood in the human body follows the flow of Qi. If there is a deficiency of righteousness, blood will be timid, and if there is an accumulation of evil, blood will be blocked. Fear can strengthen it, obstruction can lead to it. Therefore, regardless of whether the Bi syndrome is newly developed or has persisted for a long time, it is important to focus on tonifying and balancing deficiency and excess during treatment.

On the basis of focusing on replenishing the deficiency and removing the actuality, medical practitioners further discovered that the rational use of warm medicines and focusing on the treatment of Qi and blood together could more effectively deal with the complex condition of paralysis.

3.3. Make good use of warm medicine and treat Qi and blood together

The data analysis results show that the treatment of Bi syndrome is fundamentally based on warm drugs. Warm can dispel cold, unblock meridians, and dissolve dampness and phlegm. Sweet can nourish, bitter can reduce diarrhea, and pungent can disperse, so use sweet and warm products such as angelica and

astragalus mongolicus to nourish Qi and nourish the body; Warm the meridians with angelica, cassia branch, and tangerine peel; Use angelica pubescens and atractylodes bitter and warm products to dispel wind and dampness.

The association results show that angelica is at the core of the association network. angelica is warm in nature, sweet and spicy in taste, and has a strong ability to nourish blood and promote blood circulation. It has a strong ability to relieve pain through meridian circulation. In the treatment of Bi syndrome, it can not only nourish blood deficiency, strengthen body shape, but also play a role in attacking evil and unblocking meridians. Angelica appeared 345 times in all 650 prescriptions, indicating that angelica is widely used in the treatment of Bi syndrome. The "Compendium of Materia Medica" states that "there is movement in its nourishment, and there is nourishment in its movement [10]. It is a Qi medicine in the blood and also a holy medicine in the blood." The "Compendium of Materia Medica" discusses its "tonifying the five organs and generating muscles [11]. "Modern pharmacological research has shown that the volatile oils, polysaccharides, ferulic acid, and other components contained in angelica can have anti-inflammatory, anti injury, and promote hematopoietic function [12].

Angelica is commonly used in combination with tonics for tonifying deficiency, promoting blood circulation and removing blood stasis, and diuretics for promoting diuresis and dampness. In high-frequency combinations, Angelica can be combined with tonics such as wolfberry fruit, atractylodes, and gentiana macrophylla to tonify Qi and blood. It is suitable for those with severe deficiency of Qi and blood, weak and insufficient essence, specialized in nourishing Qi and blood, and relieving cold dampness and pain. Angelica, combined with achyranthes bidentata, rhizoma chuanxiong, and other blood activating and stasis removing medicines, is suitable for those with excessive evil but not severe deficiency. Angelica not only protects the Qi and blood, preventing excessive damage to the righteous Qi by removing blood stasis, but also helps with blood circulation, achieving the effect of removing blood stasis without harming the righteous. Angelica is combined with diuretics such as Poria and Coix Seed for joint treatment of symptoms. It is suitable for those who have been trapped in phlegm and dampness in the limbs for a long time, and can promote dampness, nourish blood, and relieve tendons.

In addition to the above medication strategies, exterior-resolving herbs also play an indispensable role in the treatment of paralysis, and their application is closely related to the pathogenesis of paralysis.

3.4. Key use of exterior-resolving herbs

Exterior-resolving herbs refer to those drugs mainly efficacious in dispersing exterior pathogens and relieving exterior syndromes. In traditional Chinese medicine theory, exterior syndromes are a category of syndromes where the disease location is in the muscle-surface, indicating a relatively mild condition [13]. When exogenous pathogens (such as wind-cold or wind-heat) invade the muscle-surface of the human body, the body's healthy Qi (the body's self-defense mechanism) will fight against them. As a result, symptoms such as fever, aversion to cold, headache, body aches, nasal congestion, runny nose, and cough will appear. Exterior-resolving herbs are

drugs that exert therapeutic effects against these symptoms.

Although there are only 3 types of detoxifying drugs in high-frequency drugs (with a usage frequency of ≥ 75), which appear a total of 403 times, Guizhi alone appears 212 times. In the three "Famous Doctors Cases", surface clearing drugs such as cassia branch, ledebouriella root, notopterygium root, etc. were used multiple times. Cassia branch is warm in nature, with a pungent and sweet taste. It can harmonize with the skin, benefit joints, and warm the meridians. The "Compendium of Materia Medica" states: "It is effective in dispelling evil. It mainly benefits liver and lung Qi, headaches, and spasms in wind and bone joints [14]." Modern pharmacological studies have shown that cinnamon twigs have significant analgesic effects, and the cinnamaldehyde and sodium cinnamate contained in them can also dilate blood vessels [15]. The two medicines of windproof and Qianghuo have similar effects, both of which can relieve surface coldness, but windproof is stronger than wind treatment, and Qianghuo is longer than dampness.

In ancient times, many medical experts believed that the occurrence of Bi syndrome was due to the deficiency and decline of positive Qi, coupled with exposure to cold, humid environments or drastic climate changes, which led to the invasion of wind, cold, and dampness pathogens into the human body, flowing into the limbs, meridians, and joints, resulting in the obstruction of Qi and blood and the development of Bi syndrome [16]. Therefore, the key to the occurrence of Bi syndrome lies in the external pathogenic factors such as wind, cold, and dampness trapped on the muscle surface. Therefore, extra resolving herbs such as Cassia branch, Ledebouriella root, and Notopterygium root are reused.

In long-term clinical practice, medical practitioners have also found that animal medicines have unique advantages for the treatment of paralysis, especially for cases of prolonged illness with positive deficiency and evil attachment.

3.5. Make good use of animal medicine

Among the 429 drugs used in the three "Famous Doctors Cases", there were a total of 46 animal medicines, which appeared 463 times. The history of using animal medicine to treat rheumatism has a long history. As early as in the "Shennong Bencao Jing", there were records of using grubs and flies to treat rheumatism [17]. Bi syndrome persists for a long time without healing, causing damage to the vital energy and even leading to loss of nourishing essence and blood. Animal medicine is a sentient product of flesh and blood, and its ability to nourish Qi and blood, fill essence and marrow, and nourish muscles is beyond the reach of plants and trees [18]. In addition, some insect drugs in animal medicine, such as scorpions, centipedes, and earthworms, have excellent effects in searching for wind and unblocking meridians, which can promote stagnation, dispel turbidity and evil, and achieve Qi circulation and blood circulation.

By synthesizing the above analysis of the etiology and pathogenesis of paralysis as well as the characteristics of various types of medications, we can further explore new formulas based on these medication laws to provide more effective formula choices for clinical treatment.

4. Drug clustering and innovation

Through high-frequency drug clustering analysis, 5 drug combinations can be obtained. Combining the included medical case types, diagnosis and treatment characteristics, and clustering results. The compound composed of the first and second types of drugs contains the meanings of Er Chen Decoction, Fang Ji Fu Ling Decoction, and Si Miao Wan, and is used to treat patients with Bi syndrome who suffer from severe phlegm dampness stagnation and lack of clear deficiency. The third type of medication formula is based on the combination of Qianghuo Shengshi Decoction and Siwu Decoction, with the addition of Qi tonifying and warming herbs compared to the original formula. This doubles the effectiveness of the entire formula in dispelling dampness and nourishing the body, nourishing its essence and eliminating its source, and is used to treat the syndrome of Qi and blood deficiency and excessive cold and dampness. As a commonly used formula for treating wind cold dampness syndrome, Qianghuo Shengshi Decoction has been shown to have anti-inflammatory and analgesic effects in modern research [19]. Siwu Decoction can be effective in treating limb pain caused by lack of blood nourishing tendons and empty blood vessels [20]. Both parties use it together, and then add atractylodes astragalus mongholicus, monkshood. It can warm and dispel cold, replenish Qi and blood, and clear meridians and dampness. The fourth and fifth types of medication formulas not only nourish the liver and kidneys, but also remove dampness and relieve rheumatism. Complete formula without stagnation, relaxing tendons and relieving pain, suitable for liver and kidney deficiency, rheumatism and obstruction syndrome.

5. Summary

The "Famous Doctor Cases", "Continuation of Famous Doctor Cases", and "Second Continuation of Famous Doctor Cases" can be regarded as extremely precious medical case literature in the treasure trove of traditional Chinese medicine. These classics have been accumulated over time and contain the rich clinical experience and wisdom of ancient physicians. In these medical cases, there are extremely detailed records of the treatment of Bi syndrome, involving a large number of medication combinations and carrying a huge amount of medication data information. The unique combination of various rare herbs and the use of drugs under different processing methods all reflect the diversity and complexity of traditional Chinese medicine in treating Bi syndrome.

This study aims to explore in depth the mysteries of medication for treating Bi syndrome in these three classic medical texts. By utilizing advanced data mining techniques and rigorous analysis methods, a comprehensive and detailed exploration and summary of the drugs involved are conducted. Not only did it provide a detailed classification of the efficacy of various drugs and clarify the nature, taste, and meridian of the drugs, but it also deeply analyzed the compatibility relationship between the ruler, subject, assistant, and envoy of the drugs in the formula. At the same time, with the help of modern data analysis methods, medication patterns and unique medication characteristics can be summarized from massive amounts of data. For example, discovering the high-frequency usage patterns of certain drugs in

specific regions, seasons, or among Bi syndrome patients with different constitutions.

The results of this study have made an outstanding contribution to the field of paralysis treatment in Chinese medicine, however, there are some limitations. On the one hand, due to the inherent characteristics of ancient medical records, the completeness and accuracy of the information in some cases, such as the accuracy of drug dosage and the level of detail of individual patient characteristics, may affect the in-depth analysis of the application of certain drugs to a certain extent. On the other hand, the data of the study only originated from three specific medical cases, which, although representative, could not comprehensively cover the whole picture of the use of drugs in different historical periods, regions and schools of medicine, and there is a certain degree of sample limitation.

As a preliminary exploration, this study still hopes to provide new ideas and directions for the clinical treatment of Bi syndrome in modern Chinese medicine through these preliminary explorations. I hope to inspire more medical researchers and clinical doctors to help them find more precise and effective treatment plans in the process of treating Bi syndrome, so as to achieve more ideal clinical treatment effects and bring more rehabilitation hope to the majority of Bi syndrome patients.

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