

## Data Mining Study of Chinese Herbal Fumigation and Washing in the Treatment of Perianal Eczema

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### Abstract

**Objective** To explore the law of Chinese herbal fumigation and washing in the treatment of perianal eczema through data mining. **Methods** China National Knowledge Network (CNKI), VIP Chinese Journal Server (VIP), Wanfang Statistical Information Public Service network platform (Wanfang Statistics), National Biomedical Literature Research Information Service Network Management System (SinoMed) were retrieved from the database construction to May 2020 On the research paper on the treatment of perianal eczema by traditional Chinese medicine fumigating and washing. According to the prescriptions recorded in the collected articles, Microsoft Excel or WPS was used to establish a database to analyze the drug frequency, sexual taste and meridian return, etc. IBM SPSS Statistics 18.0 statistical software was used to analyze the data of association rules based on association rules and Apriori algorithm. **Results** 286 articles were included, including 283 prescriptions, including 155 traditional Chinese medicines, 22 of which were more frequently used than 35. *Sophora flavescens* was the most frequently used drug. The medicinal taste of 155 is mainly bitter cold and simmering temperature, and mainly goes to the liver meridian. The efficacy classification is mainly heat-clearing medicine. In the association rule, the core drug pair of *Sophora flavescens* and *Phellodendron phellodendri* was the association rule (support = 73.85). **Conclusion** TCM fumigating and washing prescription drugs for perianal eczema are mainly heat-clearing drugs, accompanied by poison, insecticide and antipruritic drugs, antipruritic drugs, etc. *Sophora flavescens*, *Phellodendron phellodendri*, *Cnidium fruit*, *Difuzi fruit*, *Fructus diorrhizae*, *rhizoma dioscoreae*, parsnip and so on are frequently used.

### Keywords

Perianal Eczema; Fumigation of Traditional Chinese Medicine; Data Mining; Clustering Algorithm.

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### 1. Introduction

Perianal eczema, it is to point to stubborn anal inflammatory reaction around skin disease[1]. Lesions are limited to the skin near the anus, but also occasionally spread to the buttocks, perineum. The disease can occur at any age without significant gender differences, and the prevalence is gradually increasing. The mechanism is still not fully understood[2], but modern medicine generally identified with allergy, changes in bacterial community, endocrine disorders, psychological factors, social environment changes and other physical factors[3]. Most people typically present with severe itching and other problems such as erythema, pimples, blisters, erosion, exudation, anal skin lesions, thickening, and roughness[4]. Once become after a week of chronic anal eczema often break out repeatedly, treatment duration is long, and as a result of the special position and function of the anus and anatomic location and other comprehensive factors, makes the anus week eczema is of eczema in other parts of the body is more difficult to treat, physically and mentally to the patient thereby brought great impact, some patients with anxiety, mental tension, insomnia, mental change [5,6]. At

present, steroid steroid drugs are the most commonly used drugs in western medicine for the treatment of perianal eczema, and this drug is easy to produce dependence in the long-term application process, long-term use can inhibit the differentiation and proliferation of epidermal cells, weaken the skin barrier and function[7].The curative effect of western medicine is not ideal.Anal eczema, Chinese medicine belongs to blood wind sore, anal periwound or sores.There are many methods to treat perianal eczema with Traditional Chinese medicine, such as oral administration of traditional Chinese medicine, application of traditional Chinese medicine, fumigation and washing of traditional Chinese medicine, acupoint injection, acupoint embedding, acupuncture and so on.Among them, the treatment method of TCM fumigating and sitting bath has the advantages of direct absorption to the patient site, direct absorption to the skin, small adverse reactions, clear effects, individualized treatment, simple and convenient operation, low cost and easy acceptance, so it is widely used in clinical practice.[8]. The treatment of this disease is difficult and complicated, and Chinese herbal fumigation-washing and sit-bath treatment of this disease has a very good effect, but there is still a lack of data mining on the prescription of perianal eczema. Therefore, 283 prescriptions of TCM fumigation and washing for the treatment of perianal eczema in recent and modern journal literature were collected and sorted out in this paper, hoping to summarize and explore the medication rules of TCM fumigation and washing for the treatment of perianal eczema through this data mining, so as to better guide clinical application. Summarize the relevant results as follows.

## 2. Data and Methods

### 2.1 Data Sources:

CNKI, VIP Chinese Journal Server, Wanfang Statistics Public Service Network platform (Wanfang Statistics), National Biomedical Literature Research Information Service Network Management System (SinoMed) and other database systems are used as the main information retrieval objects. Search the published literatures on clinical trials of TCM fumigation and washing in the treatment of perianal eczema;The search date range is from database construction to May 30, 2020.Search for perianal eczema, anal eczema, Traditional Chinese medicine, fumigation, sittbath and other key words.

### 2.2 Inclusion Criteria

(1) Observation of the clinical effect of the treatment of perianal eczema with traditional Chinese medicine fumigation and washing combined with other therapies.(2) The complete medicine, prescription and definite measurement of TCM fumigation and sitbath must be clearly given.(3) For the treatment of TCM syndrome differentiation mentioned in this paper, the formulas used were recorded separately.(4) Efficacy evaluation criteria need to be clear[9].

### 2.3 Exclusion Criteria

(1) Repetitive, experimental and retrospective studies were excluded;Review, famous doctors and personal experience, nursing research and health science literature were also excluded.(2) Animal experiments and mechanism analysis.

### 2.4 Data Standardization

In accordance with the Pharmacopoeia of the People's Republic of China (2015 Edition)[10]Standardized treatment of medicinal materials, such as "white moss bark" is standardized as "alum", "dry alum" is standardized as "alum", "tribulus briar" and "white tribulus briar" is standardized as "tribulus briar", "danpi" is unified as "moutan bark" and so on.The data will be entered by two people to ensure the integrity and correctness of data mining results.

### 2.5 Statistical Methods

The herbs in the prescriptions that met the inclusion criteria were entered into Microsoft Excel WPS one by one for frequency statistical analysis, then SPSS Modeler 18.0 software was used for association rule analysis method, and SPSS 19.0 software was used for cluster analysis.

### 3. The Results

#### 3.1 Statistics of Drug Frequency

After screening, a total of 283 prescriptions were obtained, including 155 traditional Chinese medicines. The frequency of use of each prescription was calculated, and it was found that the frequency of use was 250 times at the highest and only 1 time at the lowest. Among them, there were 22 Chinese medicines with frequency  $> 35$ , and the top five medicines were Sophora flavescentis (88.33%), Phellobendri phellobendri (73.85%), Cnidium cnidii (68.19%), Difuzi (66.7%), and Difuzi (51.23%). There were 22 drugs with prescription accounting for more than 10%. See table 1.

**Table 1.** Drug frequency analysis (frequency  $\geq 16$ )

drug	Frequency of usage	Ratio of prescription /%	drug	Frequency of usage	Ratio of prescription /%
sophora	250	88.33	Chinese gall	68	24.02
Cortex phellobendri	209	73.85	angelica	64	22.61
Cnidium monnieri	193	68.19	licorice	54	19.08
Belvedere fruit	187	66.07	Herba schizonepetae	52	18.37
Cortex dictamni	145	51.23	honeysuckle	50	17.66
wind	103	36.39	The dandelion	43	15.19
Rhizoma atracytoldis	85	30.03	Chrysanthemum indicum	43	15.19
Sichuan pepper	81	28.62	Angelica dahurica	39	13.78
Radix stemonae	79	27.91	rhubarb	38	13.42
alum	73	25.79	purslane	37	13.07
China root	72	25.44	Glauber's salt	35	12.36

#### 3.2 The Frequency Statistics of Drug

efficacy were based on Chinese Pharmacy, the national planning textbook of Chinese Medicine colleges and universities during the 13th Five-Year Plan period.[11] The efficacy of 155 drugs was classified and analyzed. The frequency of TCM for clearing heat was as high as 1074 times (40.36%), followed by drugs for attacking poison, killing insects and relieving itching 274 times (10.30%), drugs for improving water infiltration and dampness 247 times (09.28%), drugs for relieving surface 244 times (09.17%) and drugs for tonifying deficiency 149 times (05.60%). Are shown in table 2. It can be seen that Chinese medicine fumigation and washing treatment of perianal eczema is mainly heat-clearing drugs.

**Table 2.** Drug efficacy frequency statistics

The serial number	classification	Frequency (times)	Frequency (%)
1	Heat medicine	1071	40.25
2	Poison, insecticide and antipruritic	274	10.30
3	Nourish the medicine	247	09.28
4	Water infiltration medicine	247	09.28
5	Tonify deficiency medicine	149	05.60
6	The wet medicine	87	03.27
7	Temperature in medicine	82	03.08
8	Antitussive antiasthmatic	80	03.01
9	Diarrhea remedy to the case	79	02.97
10	Astringent medicine	76	02.86
11	Medicine for promoting blood circulation and removing blood stasis	65	02.44
12	hemostatic	58	02.18
13	Begin to understand the medicine	48	01.80
14	(medicine	32	01.20
15	Medicine for activating blood circulation and regulating menstruation	19	00.71
16	Medicine to calm liver and extinguish wind	16	00.60
17	Spleen medicine	12	00.45
18	Remove toxic saprophytic muscle drugs	10	00.38
19	Insect repellent	8	00.30
20	Sedative medicine	1	00.04

### 3.3 Analysis Results of Four Qi

Five Flavor and Meridian of TCM The four Qi, five Flavor and Meridian of 155 TCM were analyzed according to the 2015 edition of Pharmacopoeia of the People's Republic of China.[10].The drugs included included 8 categories, including cold, warm, flat, mild cold, cold, major cold, heat and major fever. The drugs were mostly cold and warm, and the results were shown in Figure 1A. As for the five tastes, bitter and bitter were the most commonly used, as shown in Figure 1B. The liver meridian was the most, followed by the stomach, bladder and kidney meridian. As shown in figure 2.

### 3.4 Association Rule Analysis

Method IBM SPSS Modeler 18.0 software was used to analyze and calculate the included Chinese medicines and obtain the directly displayed network graph of association rules of Chinese medicines. The thick line between drugs represents association strength, and the higher the strength, the higher the frequency of common use of Chinese medicines in the treatment is, as shown in Figure 3. Apriori algorithm was used to select and set the minimum support to 15%, the minimum confidence to 90%, and the maximum number of preceding items to 3. Then, binomial, triplet and quadruplet association analysis were conducted successively, and 36 association rules of drug pairs and drug groups were obtained, which were sorted according to the support degree from high to low. The results are shown in Tables 3A, 3B and 3C.

**Table 3. A** Analysis of drug pair association rules

In the preceding paragraph	consequent	Percentage of support	Percentage of confidence
Cortex phellobendri	sophora	73.85	92.34
Cnidium monnieri	sophora	68.20	92.75
Belvedere fruit	sophora	66.08	93.58
Cortex dictamni	sophora	51.24	93.79
Rhizoma atractylodis	sophora	30.04	90.59
Sichuan pepper	sophora	28.62	93.83
Radix stemonae	sophora	27.92	96.20
Chinese gall	sophora	24.03	92.12

**Table 3. B** Association rule analysis of 3 TCM drug groups

In the preceding paragraph	consequent	Percentage of support	Percentage of confidence
Fructus cnidii and Fructus rubra	sophora	55.83	94.94
Cnidium and Phellobendron	sophora	53.71	94.08
The root of the tree, phellobendron	sophora	51.94	95.92
Albino skin, skin seeds	sophora	39.93	93.81
Ditsumia, cnidium fruit	sophora	38.16	97.22
White peel, phellobendron	sophora	37.81	95.33
Parsnip, phellobendron	sophora	26.15	90.54
Atractylodes, Phellobendron	sophora	25.44	90.28
Windproof, ground skin seed	sophora	25.08	92.96
Prickly ash, cnidium fruit	sophora	23.67	97.01
Chinese prickly ash and phellobendron	sophora	23.32	95.45
Atractylodes, ground skin	sophora	22.61	93.75
Prickly ash, ground skin son	sophora	22.26	93.65
Prickly ash, ground skin son	Cnidium monnieri	22.26	92.06
Parsnip, cnidium	sophora	21.91	93.54
100, cnidium fruit	sophora	21.55	96.72
Parsnip, dittany	sophora	21.55	93.44
100 parts, ground skin son	sophora	21.20	96.67
Soil tuckahoe and Phellobendron phellobendron	sophora	21.20	91.67
100 parts, ground skin son	Cnidium monnieri	21.20	90.00

**Table 3.** C Association rule analysis of 4 TCM drug groups

In the preceding paragraph	consequent	Percentage of support	Percentage of confidence
Fructus cnidii, Fructus fortunei, Phellodendron chinense	sophora	45.23	97.66
Fructus ditsumerii, Cnidium nidii, fructus dermatis	sophora	33.92	96.88
White peel, root and phellodendron	sophora	30.04	95.29
Dichotomous bark, cnidium fruit, phellodendron	sophora	29.33	98.80
Chinese prickly ash, ground skin seed, bitter ginseng	Cnidium monnieri	20.85	94.92
Prickly ash, Cnidium nidii, ground skin seed	sophora	20.49	96.55

### 3.5 Systematic cluster Analysis

SPSS Statistics 19.0 was used for systematic cluster analysis of the top 22 Chinese medicines in frequency. The horizontal axis in the cluster graph represents "distance", and the smaller the "distance", the greater the commonness of Chinese medicines. See Figure 4 for cluster analysis and Table 4 for cluster analysis results. As shown in Figure 4, when the intercept is 20, clustering is the theoretical study most suitable for Traditional Chinese medicine.

**Table 4.** The cluster analysis results

C1	Honeysuckle, wild chrysanthemum, angelica dahurica, Cnidium fruit, Radix sophora flavescens, Phellodendron, Atractylodes atractylodes, Chinese prickly ash, dandelion
C2	White peel, 100 parts, gallnut, purslane, poria cocos
C3	Alum, Mirabilite, rhubarb
C4	Parsnip, Schizonepeta, Angelica, licorice

## 4. Discuss

External treatment of Traditional Chinese medicine has a long history. It is generally used together with fumigation and external washing, fumigation first and then washing. It has the functions of clearing heat and dampness, activating blood circulation and detumescence, etc. It can relieve itching and pain, and is widely used in the treatment of anorectal diseases. Its documentary records can be traced back to the Classic of Mountains and Seas. In the Spring and Autumn period and the Warring States Period, the method of sit-bath was systematically discussed in the Yellow Emperor's Inner Canon, one of the four famous works in China, such as The Treatise on The Reflection of Yin and Yang: "It has evil, and the stain looks like sweat". Fifty-two Prescriptions for Diseases clearly recorded the specific method of fumigating and sitting bath for anorectal diseases by putting boiling medicinal juice into an appropriate container and placing MATS at the mouth of the container, so that the hot gas of medicinal juice can fumigate the affected place through the holes of MATS. Hua Tuo shen Fang recorded the amount of water used for decocting medicine for external fumigation and washing: "Use fifteen bowls of water to boil a hundred boiling water, pour into a clean bucket, and ask the patient to sit on it.[12]" Through the study of the curative effect of fumigation and external washing therapy, physicians of all dynasties have provided a solid theoretical basis for us. Modern medical research discovery, medicinal materials in the steam generated after boiling, the drugs containing a large number of alkaloids, amino acids, etc., can inhibit the release of skin inflammation

molecules, thereby reducing the permeability of capillary, improve microcirculation. Because of its special position around the anus, the dregs are excreted there, and the skin environment is not easy to ventilate and airtight for a long time. Fumigation and sit-bath is a better choice for perianal eczema. Ancient Chinese medicine books of perianal eczema can be classified as "wet selection" "sores" "blood wind sores" "anal wet selection" "perianal wind" "blood wind sores", which belongs to the category of "eczema". Perianal eczema pathogenesis complex, traditional Chinese medicine believes that the main pathogenesis of the disease is wind, wet, heat evil three mutually knot in the skin, resulting in perianal local qi and blood running is not smooth, depression cou Rationale and onset. Wet is Yin evil, easy to attack Yin position, because the anus is in the lower part of the human body, so the evil often accumulate in this, so, wet evil throughout the development of the disease, is the main cause of the disease. Wet evil can be accompanied by wind evil, heat evil invading muscle table Cou, external evil guest in skin Cou, can not reach, can not be dredged, can cause gas block, long heat, so perianal eczema has the characteristics of wind, wet, heat inclusion. This study result shows that the classification of traditional Chinese medicine fumigation treatment crissum eczema high-frequency belonged to three categories also accord with the main drug treatment of the disease, the first category to bitter ginseng, cortex phellodendri, etc of heat dry wet medicine, bitter arguments are all compound in frequency, the most bitter arguments for heat dry wet medicine, according to "compendium of justice" records: "Sophora flavescens, it can reduce fever and relieve dampness during great hardships and cold. Its effect is similar to that of Scutellaria, Lian and Gentian. The more bitter the sophora flavescens, its driness is more intense, so it can kill insects born of dampness and heat. Especially good treatment of Yin swelling Yin itching, wet sores, skin itching, anthrax disease. Modern studies show that both sophora flavescens decoction and matrine can inhibit the activity of PLA2, so it has obvious anti-inflammatory effect. Sophora flavescens could inhibit pruritus induced by 5-HT in experimental animals. Oxymatrine inhibited the allergic immune response induced by DNFB[13]. Visible sophora flavescens is to adjust perianal eczema to medicine. Phelodendron phelodendron is also a medicine for clearing heat, dryness and dampness, and the frequency of sophora flavescens is only the second in the formula. The earliest medicinal record of Phelodendron phelodendron is found in Shennong Bencaojing, which is listed as top grade. It tastes bitter and cold, and the main intestine is hot. Modern pharmacological studies show that[14] C. phelodendri has a strong inhibitory effect on *Staphylococcus aureus* (SA), *Staphylococcus epidermidis* (ET), *Streptococcus pyogenes* (SP), etc. It can be widely used in the treatment of clinical skin diseases such as perianal eczema. And the strongest drug pair was Sophora flavescens and Phelodendron phelodendri according to the association rules mined by this data. Both drugs could clear heat and dryness, and their drug power was stronger when used together. The second category of drugs to cnidium, the skin of the main antipruritic drugs, cnidium for the use of the highest frequency of antipruritic antipruritic drugs. Cnidium fruit has the functions of warming kidney and helping Yang, dispelling wind, dryness and dampness, killing insects and relieving itching. Its taste is spicy, bitter and its sex is warm. Chen Shiduo, a famous doctor in the Qing Dynasty, once said in his Book This Innovation: "Cnidium fruit has a very strange function. It can be treated both inside and outside, but it is better to treat outside." Clinical more external use of cnidium in the treatment of eczema itching. Experimental studies have shown that R2, the active component of Cnidium cnidium, can significantly increase the pruritic threshold of histamine phosphate to guinea pigs, and significantly inhibit the pruritic response of mouse skin caused by 4-aminopyridine[15]. The third class of drugs is the antiwind-dispelling medicine of fangfeng and Atractylodes atractylodes. The main role is to dispel wind and relieve itching. Wind is the long cause of all diseases, and the six evil qi are all guided by wind evil. Wind evil with light Yang open leak, good and number of characteristics change, invasion muscle table will lead to osteoporosis, skin itching pain; And the wind evil good walk, line is not fixed, its disease often change, one after another. Anal week eczema is itchy difficult to endure, when hair stop, because of wind evil more. Windbreak can lead blood back to the meridian, by evil, scattered wound, play the effect of dispersing wind and relieving itching, modern pharmacological research shows that windbreak has antipyretic analgesia, anti-inflammatory antibacterial, regulating body

immunity[16].*Atlodes atlodes* has the functions of invigorating spleen dryness and dampness, dispelling wind and dispersing cold.Tang Yufang etc.[17]Through the bacteriostatic experiment, it was proved that the volatile oil of *Atractylodes* *atractylodes* had strong bacteriostatic effect on *Staphylococcus aureus*, *Aspergillus flavus*, *penicillium* and yeast.To sum up, the treatment methods of TCM fumigation and washing for perianal eczema are mainly "clearing heat and detoxifying, dispelling wind and dampness, killing insects and relieving itching".

This study drug sexual flavour to the statistical results show that the medicinal to cold, warm, flat medicine more, five more is given priority to with bitter, bitter, sweet, belong to the main is liver, stomach, medicinal, hot in anus week eczema accounted for a large proportion, the reason should be fever cold, cold medicine can cool blood blood, qingrejiedu, qinggan purging fire, ziyan except steamed, etc., such as warm drugs, On the one hand, it can have a very good dryness effect. On the other hand, it can prevent drugs from being too bitter and cold, hurting the human Yang. Flat drugs also reflect the treatment, pay attention to the four gas coordination of drugs, and prevent drugs from being too much.Medicinal properties in terms of bitter taste "purging, drying, to" for the hot and humid sheng, available bitter medicine to clear heat dry wet, such as *rhizoma coptidis*, *radix scutellariae*, *cortex phellodendri*, *sophora*, flavor in addition to the common line dispersion effect, can be "sheen to embellish," long eczema, local stagnation of qi and blood, and leather wear injury thick rough, itching, dark color, so yi qi and scattered silt, And symplectic flavour is separated, cou justified, fluid distribution, in order to help save dry, umami "can fill, and, slow", the general and pathogenesis of eczema rheumatic fever, if excessive use of their drug treatment, in order to prevent the Fairbanks spoil one's appetite, at this time should add to temper medicinal adjuvant, and be able to fill in, such as spleen and dehumidification of semen coicis medicine.To the side, it can be seen in liver, spleen as the center the importance of treating eczema, as long as the pathogenesis of eczema is wet, the liver factor, the factors, the spleen and the main operation, and the influence on each other and appear problem, if the pathogenesis of liver function is easy to cause the spleen is not operation, and the wet, the origin of heat YuJiu, easy blocking qi activity, further influence the function of the liver factor, so the more differentiation from liver and spleen.

Association rule is one of the most commonly used data mining techniques in medical literature collation. It finds the hidden associations in the database through association analysis of high-frequency project groups in the data set[18], drug combination in association rules, bitter in cortex phellodendri correlation is strongest, followed by bitter in common cnidium fruit, belvedere fruit, 7 cortex dictamni, these drugs are one of the five Chinese medicine medicine with high frequency is consistent, these commonly used medicines and drug combination is clear heat drugs, antipruritic between different combination, visible for wet and relieving itching is an important therapeutic principles of anus week eczema.In the cluster analysis results, the first and second groups of drugs focused on clearing heat, dampness and detoxification, which were suitable for patients with heavy dampness and heat to produce toxic pathogens.The third group of drugs for the addition and reduction of Dachengqi decoction, Dachengqi decoction syndrome is dry heat and fu qi obstruction both pay equal attention to, severe cases even appear under the heat damage kidney Yin Yang Ming Fu real heat syndrome, rhubarb can not only enter the Yang Ming fu, catharsis real heat, but also blood, promote blood stasis;And mirage soft and hard loose, help rhubarb attack heat accumulation, plus alum good detoxification insecticide, dampness and itching, can be applied to eczema accompanied by yangming fu evidence;The fourth group of drugs focuses on dispersing wind and detoxifying, promoting blood circulation, which is suitable for eczema with rheumatic fever invading from outside.

To sum up, the data mining, analyzes and sums up the, in recent years, traditional Chinese medicine fumigation treatment crissum medication rule and compatibility characteristics of eczema, high-frequency medicines for heat dry wet, insecticidal antipruritic, drugs used in sexual cold, bitter taste, to pass through the liver meridian to cure disease in classics, through data mining with the highest degree of confidence associated with drugs for bitter, cortex phellodendri, The clustering analysis is classified into 4 categories. It is expected that this data mining can provide ideas for clinical treatment of perianal eczema with traditional Chinese medicine fumigation and washing. It is also expected that

there will be more comprehensive data mining in more aspects and better literature support in the future, so as to carry out more multi-angle and multi-level data mining for traditional Chinese medicine treatment.

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