Analysis of the efficacy of Chinese medicine in the treatment of covid-19 and the study of medication pattern

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Abstract. In order to explore the efficacy and medication pattern of Chinese medicine in the treatment of COVID-19, we conducted statistics on the medication use of Chinese medicine based on some clinical data of novel coronavirus pneumonia (COVID-19) and related literature, and used the statistical method of frequency analysis to screen out the drugs with high frequency of use in patients with different types of novel coronavirus pneumonia (COVID-19). We used the statistical method of frequency analysis to screen out the core drugs with high frequency of use in patients with different types of novel coronavirus pneumonia (COVID-19) and the related main drug symptoms; Several drugs with good conversion effect were screened out by mean comparison method in terms of conversion time of drugs, and drug analysis was also conducted by data mining and other methods, so as to derive several groups of core drug combinations of Chinese medicine in the treatment of novel coronavirus pneumonia (COVID-19), and to provide data support and research directions for the effectiveness of Chinese medicine intervention in the treatment of novel coronavirus pneumonia (COVID-19).

Keywords: Chinese medicine, Novel coronavirus pneumonia (COVID-19), Mean value comparison, Data mining.

1 Introduction

Novel coronavirus pneumonia (coronavirus disease 2019, or COVID-19) has been spreading in various provincial and municipal areas of China, and even globally, since the outbreak in Wuhan, Hubei, and has seriously affected people's lives [1]. The incubation period of the disease is usually 1-14 days, mostly 3-7 days, and up to 24 days [2]. He is highly contagious, and the main source of infection is the infected patient, in addition, asymptomatic infected persons may also be a source of infection. Once infected heavy up to life threatening, its morbidity and mortality rate can reach 2.3% in previous reports. Therefore, the country has invested a lot in limiting the spread of the virus, and it is especially important to quickly detect patients with the virus and isolate the infected.

Chinese medicine plays an important role in the study of the prevention and treatment of

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novel coronavirus pneumonia (COVID-19). His main research is the law of formula preparation. To bring prescriptions into the most effective preventive and therapeutic effect, we must combine the symptoms of the condition and also make reasonable combinations according to the idea of TCM diagnosis and treatment. Therefore, how to use the prescriptions and treatment data in prevention to analyze the effective herbal medicines and combinations can provide data support for herbal interventions, effectiveness analysis after research direction.

2 Related work

At present, there is no targeted treatment for novel coronavirus pneumonia (COVID-19). In the study of novel coronavirus pneumonia (COVID-19) and herbal medicine related papers are mainly divided into pharmacology related to prescriptions, research on therapeutic mechanism, analysis and action of active ingredients of herbal medicine, and research on the pattern and action of herbal medicine based on various types of statistics. Commonly used research methods are generally statistics, machine learning, data mining, network pharmacology, and various types of network structure diagrams presenting analysis results. Different levels of analysis have been conducted in drug distribution, herbal efficacy classification, herbal flavor classification, herbal attribution classification, etc.

In the previous studies on the drug-formulation pattern of traditional Chinese medicine, the frequency of drug occurrence was generally used as a statistic to screen out the drugs with high frequency to obtain the core drugs for the treatment of novel coronavirus pneumonia (COVID-19). The grouping pattern was adopted for drug-drug association analysis, and the core group of prescription drugs was screened by setting the confidence and support level. Xueying Wang in exploring the characteristics of Chinese herbal medicine in the core grouping formula of novel coronavirus pneumonia (COVID-19) test case adopted association rule analysis in data mining for the analysis of drug ratios with high frequency to derive the core grouping formula, but no more in-depth study was conducted on the effect of the speed of drug conversion. Wu Hongying used frequency analysis to calculate the frequency of drugs used in the prevention and treatment protocols in the investigation of the drug use pattern of Chinese medicine for the prevention and treatment of novel coronavirus pneumonia in various regions of China, and obtained the high frequency core drugs in the treatment of novel coronavirus pneumonia (COVID-19) and also used Excel 2003 to count the frequency, flavor, ascription and efficacy classification of Chinese medicines.

In the study of this paper, because of the use of domestic data and the combination of Chinese and Western medicine in the treatment, the role of Chinese medicine in the treatment lacked the control group of Chinese and Western medicine, and the method of mean comparison was used to analyze and obtain the drugs and symptoms that were positively correlated with the rate of conversion, and the correlation analysis of the drugs was conducted on the basis of the obvious correlation, and the good prescription ratio was screened by the correlation analysis of the combination characteristics of Chinese medicine, and the different ratios of drugs used in different syndromes and the characteristics of Chinese medicine and the syndromes, syndromes and other related characteristics of Chinese medicine were also analyzed in depth.

3 Information sources and analysis

3.1 Source

Based on clinical data provided by an institution for the treatment of novel coronary

pneumonia and relevant literature from three major databases, China Knowledge Network, Wanfang and Vipul.

3.2. Basic information of the data

3.2.1 Analysis of the frequency of underlying disease in different typing of patients with novel coronavirus pneumonia (COVID-19)

We obtained a total of 616 patients with novel coronavirus pneumonia based on the clinical data provided, and the patients were divided into ordinary type, light, critical type, asymptomatic patient, and heavy according to their disease status. Excluding the number of unknown type 37, the numbers of patients were 384, 61, 28, 24, and 82, accounting for 62.3%, 9.9%, 4.5%,3.9%,and13.3%, respectively. The underlying diseases varied among patients of different typing, and the top three diseases with the highest proportion of all underlying diseases were hypertension, diabetes mellitus, and heart disease, whose proportions were 15.74%, 7.61%, and 6.30%, respectively. Hypertension accounted for the highest proportion of patients with common type, light type, critical type, asymptomatic infections, and heavy type, with 35, 5, 5, 2, and 12 patients.

3.2.2. Age distribution of patients with novel coronavirus pneumonia (COVID-19) in different typing

Most of the clinical patients were 30-60 years old, with a median age of 47 years. The median age of asymptomatic patient patients was 28 years, the median age of light type patients was 37.5 years, the median age of ordinary type patients was 45.5 years, the median age of heavy patients was 53 years, and the median age of critical type patients was 66.5 years.

3.3 Application and analysis of Chinese medicine

3.3.1 Frequency of Chinese medicine use

According to the treatment at that time, these patients used Chinese medicine for adjuvant treatment, in which patients of different typing used different Chinese medicine formulas. We extracted the frequency of medication use in the prescriptions for patients with different typing and correlated them with their symptoms. Among the prescriptions prescribed for different patients, we used the method of frequency analysis to screen out the drugs that were used more frequently for analysis, and came up with a total of 20 core drugs that were used ≥100 times, and the top five drugs were licorice, poria cocos, bitter almond, Chen Pi, and pinellia. The results are detailed in Table 1.

3.3.2 Frequency analysis of drug efficacy of Chinese medicine in the treatment of novel coronavirus pneumonia (COVID-19)

In order to determine the efficacy of Chinese medicines, we combined the specific efficacy of the drugs used in different typing of patients to produce statistics on the core drugs with high frequency of use, as well as the frequency of use in different typing of patients, and arranged them in descending order, and the results are shown in Table 2. The efficacy of the Chinese medicines used was mainly based on tonifying qi, resolving dampness, relieving exterior and dispersing cold, inducing diuresis for removing edema, and regulating qi, while

the efficacy of the Chinese medicines was not particularly sensitive in patients with different typing.

Table 1. Frequency distribution of core drugs of traditional Chinese medicine in covid-19 prescription.

Serial number	Traditional Chinese medicine	Frequency/ time	Serial number	Traditional Chinese medicine	Frequency/ time
1	Licorice	510	11	Radix Bupleuri	251
2	Poria cocos	423	12	Platycodon grandiflorus	247
3	Bitter almond	392	13	Ephedra	209
4	Chen Pi	370	14	Coix seed	204
5	Pinellia ternate	347	15	Lonicera Japonica	200
6	Astragali Radix	312	16	Fresh Fresh Ginger	197
7	Atractylodes lancea	301	17	Forsythia	183
8	Patchouli	298	18	Grass fruit	140
9	Rhizoma atractylodis	292	19	Codonopsis pilosula	130
10	Magnolia officinalis	271	20	Pepperweed seed	129

Table 2. Frequency distribution of drug efficacy in covid-19 prescription.

		Ordinary type	Light type	Critical type	Asymptomatic patient	Heavy type	Total
Effect	Tonifying Qi	1505	172	251	49	369	2346
	Dissipating Dampness	1209	195	101	29	358	1892
	Relieving exterior and dispersing cold	938	138	116	33	227	1452
	Inducing diuresis for removing edema	793	104	72	18	171	1158
	Regulate Qi	766	97	94	16	176	1149
	Clearing heat and resolving phlegm	603	99	96	23	175	996
	Clearing away heat and toxic material	552	106	71	41	162	932
	Divergent wind heat	488	79	79	21	110	777
	Clearing heat and drying dampness	422	46	80	10	129	687
	Clearing heat and purging fire	406	48	66	12	148	680

3.3.3 Mean value comparison overall turning negative time

In the study of this paper, because of the use of domestic data, the combination of Chinese and Western medicine in the treatment, so the role of Chinese medicine in the treatment of the lack of Chinese and Western medicine control group, we used the method of comparison of means, calculated the mean value of the overall drug prescription to turn negative, the mean value of 26.507, the standard deviation of 9.3501, and then the drug to turn negative time to find the mean value, and then the descending order of arrangement and the overall drug to turn negative time for comparison., and the top 10 drugs with higher mean values were selected by comparison, among which the turnaround time of Radix Bupleuri,

Atractylodes lancea and platycodon grandiflorus was faster than the overall turnaround time, as detailed in Table 3.

Table 3. Comparison of mean value of turning negative time of core drugs.

Serial number	Medicine	Mean value	Number of aquare meters used	Standard deviation
0	Total	26.507	10168	9.3501
1	Radix Bupleuri	25.426	251	8.9763
2	Atractylodes lancea	25.678	301	9.6802
3	Platycodon grandiflorus	25.806	247	9.868
4	Ephedra	26.196	209	9.4658
5	Forsythia	26.208	183	9.4311
6	Astragali Radix	26.304	312	9.0746
7	Grass fruit	26.371	140	9.0477
8	Codonopsis pilosula	26.477	130	9.5797
9	Bitter almond	26.523	392	9.1226
10	Poria cocos	26.57	423	9.3826

3.3.4 Association rule analysis of good effect of drug conversion in the prescription of Chinese medicine in the treatment of COVID-19.

The 15 core drugs screened by frequency analysis and comparison of mean values of conversion were subjected to association rule analysis, setting the minimum condition degree as 18, the minimum rule confidence degree as 90, and the maximum top three as 3. The 2 groups of drugs with the highest confidence degree according to the analysis were " Licorice ->Coix seeds and Platycodon grandifloras and Chen Pi (100%)" and " Licorice ->Coix seeds and Platycodon grandifloras and Poria cocos (100%)" The results are shown in Table 4 below.

Table 4. Analysis of association rules of drug combinations in Chinese medicine against COVID-19.

	Traditional Chinese medicine		
Consequent	The aforesaid	Degree of support	Confidence
Licorice	Coix seed,Platycodon grandiflorus,Chen Pi	18.125	100
Licorice	Coix seed,Platycodon grandiflorus,Poria cocos	18.438	100
Licorice	Atractylodes macrocephala,Pinellia ternata,Bitter almond	26.562	98.824
Licorice	Radix Bupleuri,Pinellia ternata,Bitter almond	24.688	98.734
Licorice	Coix seed,Pinellia ternata,Bitter almond	24.062	98.701
Bitter almond	Ephedra,Dried tangerine peel,Licorice	23.75	98.684
Astragali Radix	Atractylodes macrocephala,Radix Bupleuri,Poria cocos	23.75	98.684
Licorice	Coix seed,Pinellia ternata,Dried tangerine peel	22.5	98.611
Astragali Radix	Atractylodes macrocephala,Radix Bupleuri,Dried tangerine peel	22.5	98.611
Licorice	Platycodon grandiflorus,Pinellia ternata,Bitter almond	22.188	98.592

4 Discussion

According to the Health Care Commission, the total efficiency of TCM participation in the rescue and treatment of COVID-19 in Beijing alone was 92%[3]. The locus of novel coronavirus pneumonia is in the lung and spleen, with severe disease and heart. His basic

etiology is "dampness and toxicity", and we should treat the symptoms by dispersing cold and dampness, removing filth and detoxification, and diarrhea of heat and internal organs [4].

In this paper, we analyzed the clinical data of patients treated for novel coronavirus pneumonia (COVID-19) and found that, firstly, elderly people are susceptible to and at high risk of developing novel coronavirus pneumonia (COVID-19) because of their weak immune function and the presence of many underlying diseases, and they are also the majority of the critically ill. Among the underlying diseases, patients with hypertension, diabetes, and heart disease are more likely to be infected and have relatively more severe conditions. Therefore, we need to pay more attention to the elderly and patients with hypertension, diabetes, and heart disease, and early elevation and regulation of their organism immune function can reduce the complications and morbidity and mortality of novel coronavirus pneumonia (COVID-19). Secondly, from the 193 herbs involved in the prescriptions used for the recovery of patients with novel coronavirus pneumonia (COVID-19) from medication to conversion, the top 5 in terms of frequency of drug use were licorice, poria, bitter almond, Chen Pi, and pinellia. Licorice as a common herb in the treatment of diseases in Chinese medicine usually plays a role in the transfer, here the significance is not great, the focus is still in Poria, bitter almond, Chen Pi, pinellia and so on. According to the pathogenic characteristics of new coronavirus pneumonia (COVID-19) such as "dampness, toxicity, stasis and deficiency", the efficacy of these commonly used drugs mainly focus on tonifying qi, resolving dampness, clearing heat and detoxifying toxins, promoting water retention and decongesting swelling, and regulating qi, etc., which are all aimed at the pathogenic characteristics of new coronavirus pneumonia, so more research should be conducted on drugs with related efficacy. Therefore, more research should be conducted on drugs with related effects. The associated drug groups with better effect of drug conversion were mainly " Licorice ->Coix seed and Platycodon grandifloras and Chen Pi" and " Licorice ->Coix seed and Platycodon grandifloras and Poria". ", and these drugs have certain phase value by mean comparison, and we can conduct further study on this basis. In summary, this study is based on the analysis of the efficacy of Chinese medicine in the treatment of COVID-19 and the study of the law of medication, and the drug analysis of the prescriptions with good effect on the conversion of clinical patients through data mining, and we hope that the results can provide reference for further enriching and improving the selection of drugs for the prevention and clinical treatment of COVID-19, and contribute to the early victory of the epidemic.

Reference

1. WANGDW, HUB,HUC,et al.Clinical characteristics of 138 hospitalized patients with 2019 Novel CoronavirusInfectedPneumoniainWuhan,China[J/OL].JAMA[2020-03-06].https://jamanetwork.com/journals/jama/fullarticle/2761044.
2. GUANWJ,NIZY,HUY,et al.Clinical characteristics of 2019 novel coronavirus infection in China[J/OL].MedRxiv.(2020-02-09)[2020-03-06].http://dx.doi.org/10.1101/2020.02.06.20020974.
3. Liu Qingquan,Xia Wenguang,An Changqing,et al.Reflections on the role of combined Chinese and Western medicine in the treatment of neocrown pneumonia[J/OL].Chinese Medical Journal,1-2[2020-02-19].http://kns.cnki.net/kcms/detail/11.2166.r.202200215.1057.002.html.
4. Wu, Y. K..Treatise on plague.[M]//Yu Bohai. Integration of the famous works on typhoid and jin kui warm diseases.Beijing:Huaxia Publishing House,1997.