Study on the law of TCM medication for for mild and medium-sized coronavirus pneumonia based on an ancient doctor case cloud platform

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Abstract: The aim of this study was to analyze the medication rules of traditional Chinese medicine for mild as well as common type novel coronavirus pneumonia using the ancient doctor case cloud platform, and to provide a reference for clinical practice.We used computers to search CNKI, Wanfang, Wipe, PubMed, and Web of science databases for clinical randomized controlled trials of Chinese medicine in the treatment of mild and ordinary novel coronavirus pneumonia, extracted effective data into Excel tables and established a database of Chinese medicine prescriptions. With the help of the "data mining" function module of the ancient and modern medical record cloud platform (V2.3.5), we realized the analysis of drug frequency, taste, meridian tropism, clustering, and core prescriptions.Result display the study included 59 literatures and 87 TCM prescriptions involving 154 drugs with a total frequency of 1091 times, of which the high-frequency drugs included liquorice, scutellaria baicalensis, bitter almond, ephedrine and Atractylodes macrocephala et al. The medicinal four gases dominated by warm, cold, and clam, and five tastes are involved mainly including simba, bitterness, and gump; The warp reduction of medicines mainly involves the lungs, stomach, and spleen; The syndromes mainly involve dampness heat closed lung syndrome, cold dampness closed lung syndrome, dampness toxin closed lung syndrome; The cluster analysis results showed that the top 20 drugs in descending order of applied frequency could be classified into three major clusters; Complex network analysis revealed that traditional Chinese medicine treatments for mild as well as common forms of new crown pneumonia were prescribed with licorice, ephedra, scutellaria baicalensis, Pinellia ternata, gypsum, bitter almond, and radix bupleuri as core prescriptions.Traditional Chinese medicine treatment of mild as well as common forms of new coronavirus pneumonia is based on dampness dissolving table, clearing heat, eliminating phlegm, and antiasthma, and on toning yuan Qi, the therapeutic drugs are mostly selected on the basis of simba and bitterness products, ascribing the lungs and spleen to most drugs, and the method of deep inclusion and invigorating evil and Fuzheng.

1. Introduction

The novel coronavirus pneumonia (NCP) is an acute respiratory infectious disease that emerged in Wuhan at the end of 2019. Due to its high infectivity and wide susceptibility, it has caused a significant global outbreak. In February 2020, the World Health Organization officially designated it as "Coronavirus Disease 2019," while identifying the virus responsible for the disease as Severe Acute Respiratory Syndrome Coronavirus Type II. As of May 2021, there have been a total of 162 million cases and 3.3 million deaths worldwide [1]. The initial presentation of COVID-19 resembles that of influenza, with infected individuals primarily experiencing fatigue, fever, and dry cough. As the disease progresses, severe cases can lead to dyspnea, respiratory distress syndrome, septic shock, and even fatality, posing a serious threat to global health and well-being. Chinese herbal medicine possesses characteristics such as multi-target compound effects and non-specific regulation of the human immune system; thus exhibiting promising antiviral properties. Numerous studies have demonstrated that Chinese medicine treatment can alleviate clinical symptoms in COVID-19 patients, reduce the incidence rate of severe illness, and play a crucial role in prevention [2]. This study utilizes an ancient and modern medical record cloud platform software to conduct comprehensive research and analysis on traditional Chinese medicine prescriptions for treating novel coronavirus pneumonia; aiming to provide valuable insights for clinical application.

2. Materials and methods

2.1 Data sources and retrieval methods

A computerized search of the journal literature of the research category of clinical trials of traditional Chinese medicine for the treatment of new crown pneumonia was performed in the databases CNKI, Wanfang, Weipu, PubMed, web of science. The Chinese databases were all searched, and the searched terms included "new corona pneumonia", "new coronavirus pneumonia", "COVID-19", "sars-cov-2", "traditional Chinese medicine", "TCM", "Decoction", "formula", "integrated traditional Chinese medicine", "clinical trial", "clinical study", "clinical observation", and "randomized control". For knowledge, the formula was retrieved as: SU = ('New corona pneumonia'+'new coronavirus pneumonia'+'COVID-19'+'sars-cov-2') and SU = ('traditional Chinese medicine' + 'traditional Chinese medicine' + 'Decoction' + 'formula' + 'integrated traditional Chinese medicine') * SU = ('clinical trial'+'clinical study'+'clinical observation'+'randomized control'). The English search formula was subject = (COVID-19 or sars-cov-2), (Chinese therapy or traditional Chinese Medicine) and (clinical research or clinical observation). The retrieval time ranges were all from the build of the library to 2 June 2022.

2.2 Literature inclusion and exclusion

2.2.1 Inclusion criteria

(1)Included articles were published clinical randomized controlled trials of traditional Chinese medicine for the treatment of COVID-19; (2)The subjects of the study were patients with confirmed mild and common COVID-19: (3)The treatment methods are mainly traditional Chinese medicine (TCM) and contain clear TCM treatment prescriptions, while the control group can be treated with Chinese and Western medicine; (4)It has a clear evaluation of efficacy, and meets the recognized evaluation criteria of efficacy at home and abroad.

2.2.2 Exclusion criteria

The exclusion criteria were repeatedly published literature, literature without specific prescription of traditional Chinese medicine, literature review on the treatment of COVID-19 with traditional Chinese medicine, and literature on the treatment of COVID-19 with moxibustion and other non traditional Chinese medicine as the main intervention measures.

2.3 Data extraction and normalization

The disease names, TCM syndromes, and TCM prescriptions that met the inclusion requirements in the literature were extracted to excel (2021), in which multiple TCM prescriptions were included as in one literature. The names of the traditional Chinese medicines were standardized according to the Pharmacopoeia of the people's Republic of China, 2015 Edition (Part I), as ""Radix Astragali" is regulated for ""Astragali"", "ily magnolia flower" is regulated for "lily magnolia", and "Yun Ling" is regulated for "Poria", among others. The normative data were aggregated and a database was established for data mining analysis using the ancient medical and casework cloud platform (v2.3.5).

2.4 Data analysis

In this study, the "data mining" function module in the cloud platform of ancient and modern medical records (V2.3.5) was used to carry out statistical analysis, sex and taste normalization analysis, association rules, cluster analysis and complex network analysis of the data, so as to realize the frequency of drugs, sex and taste normalization, association analysis between TCM syndromes and drugs, cluster analysis and deep rule mining of core prescriptions.

3. Result

3.1 Literature search and screening

The initial search yielded a total of 1871 articles, using the "find duplicates" option in the "references" of endnote software to find duplicates, after manual removal and screening with the above inclusion and exclusion criteria, a total of 59 valid articles and 87 prescriptions were obtained.

3.2 Drug frequency analysis

Table 1: Commonly used Chinese medicine frequency table (frequency ≥30)

Number	Chinese name(s)	frequency	Percentage
1	licorice	58	66.67
2	Scutellaria baicalensis	45	51.72
3	bitter almond	42	48.28
4	ephedra	36	41.38
5	Pinellia ternata	35	40.23
6	patchouli	34	39.08
7	radix bupleuri	33	37.93
8	rhizoma atractylodis	32	36.78
9	Poria cocos	30	34.48
10	gypsum	30	34.48

Statistical analysis of the frequency of 87 included prescriptions showed that 154 drugs were involved, with a total frequency of 1091. According to descending order, 10 drugs were used more than or equal to 30 times: licorice (58 times), scutellaria baicalensis (45 times), bitter almond (42 times), ephedra (36 times), pinellia ternata (35 times), patchouli (34 times), radix bupleuri (33 times), rhizoma atractylodis (32 times), poria cocos(30 times) and gypsum (30 times). (See Table 1 for details)

3.3 Analysis of drug taste and channel

The progressive taste reduction analysis of the first 87 prescriptions for the treatment of COVID-19 showed that the four main gases involved were warm (326 times), cold (206 times), and calm (176 times), and the five tastes involved simba (544 times), bitterness (481 times), and gump (392 times). It mainly involved lung (704 times), stomach (512 times) and spleen (458 times). See Figure 1 for details.
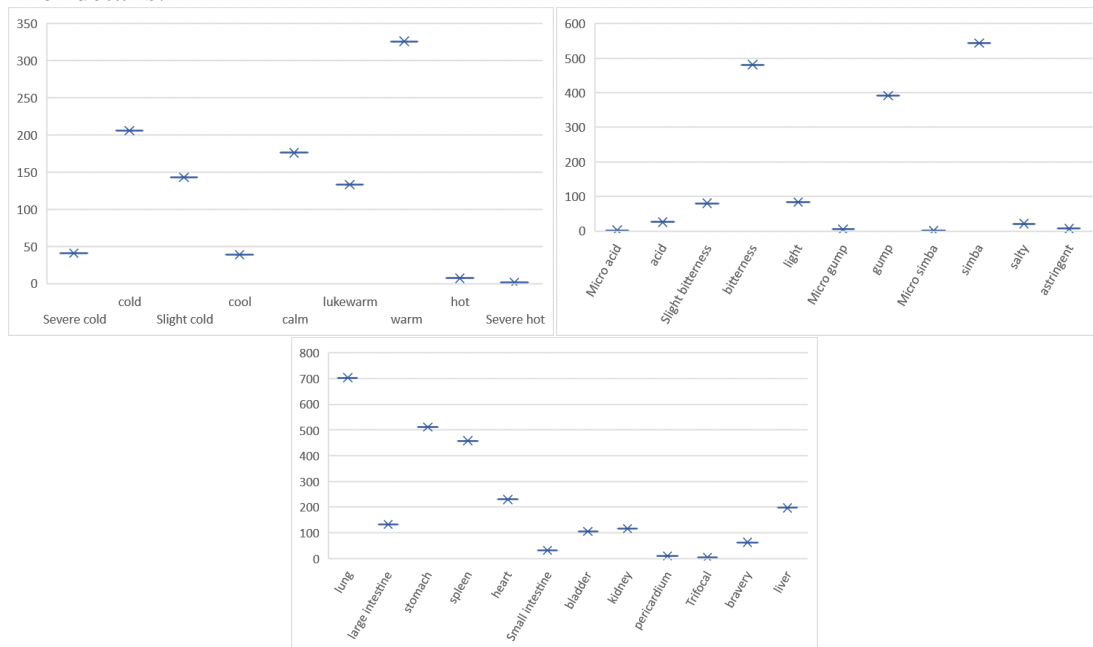

Figure 1: Statistical radar map of four gases, five tastes and warp reduction of medicines

3.4 Drug cluster analysis

Cluster analysis was carried out on the top 20 drugs in descending order of application frequency in the platform. The distance type was set as absolute distance, and the clustering method was set as the longest distance method. As shown in Figure 2, drugs were divided into three major clusters: $C_{20}1$ included licorice, Scutellaria baicalensis and radix bupleuri; $C_{20}2$ drugs include coix seed, reed root, Forsythia suspensa and Platycodon grandiflorum; $C_{20}3$ includes gypsum, bitter almond, ephedra, Pogostemon cablin, rhizoma atractylodis, magnolia officinalis, Amomum tsao-ko, betel nut, Pinellia ternata, Poria cocos, pericarpium citri reticulatae, Atractylodes macrocephala, and ginger.
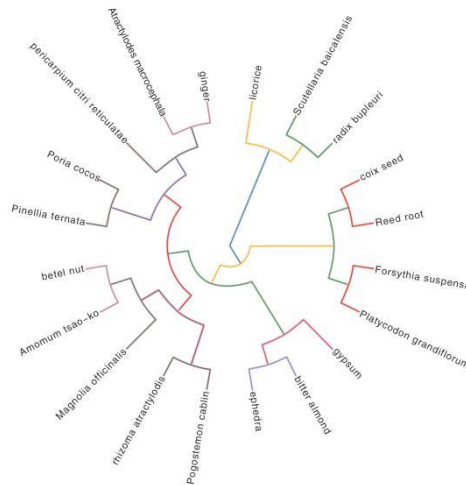
Figure 2: Drug cluster analysis diagram

3.5 Analysis of drug core prescription

The hierarchical network algorithm was used in the platform to analyze the core prescriptions of the 87 first prescriptions of traditional Chinese medicine for the treatment of COVID-19, and the edge weight was set as 10 and the coefficient as 1.3. Among them, the different weights among drugs represented the importance of the relationship between drugs. The main core prescriptions for TCM treatment of COVID-19 are licorice, ephedra, Scutellaria baicalensis, Pinellia ternata, gypsum, bitter almond and radix bupleuri. The complex network analysis is shown in Figure 3.

Figure 3: Drug complex network analysis diagram

3.6 Syndromes associated with traditional Chinese medicine (TCM) analysis

A syndrome drug association analysis was performed on 45 prescriptions of well-defined TCM syndromes, setting the confidence level > 0.6 and the support level > 0.05. A total of 14 association data were screened, and after analysis, it was found that the mild form as well as the syndrome of common type of new crown pneumonia mainly involves dampness heat Yun lung syndrome, cold dampness Yun lung syndrome, dampness depression lung syndrome as well as toxin closing lung syndrome, and the main drugs include scutellaria baicalensis, Pogostemon cablin, Pinellia ternata, rhizoma atractylodis, Magnolia officinalis, and licorice, which are listed in Table 2.

Table 2: Correlation analysis table syndrome - drugs

Number	TCM syndrome	Chinese name(s)	Degree of confidence	support	Degree of lift
1	Pneumoniae closed lung syndrome	rhizoma atractylodis	1.0	0.07	2.14
2	Pneumoniae closed lung syndrome	rheum officinale	1.0	0.07	7.5
3	dampness heat closed lung syndrome	Scutellaria baicalensis	0.91	0.22	1.95
4	dampness toxin closed lung syndrome	bitter almond	0.86	0.13	1.76
5	cold dampness closed lung syndrome	rhizoma atractylodis	0.83	0.22	1.78
6	dampness heat closed lung syndrome	licorice	0.82	0.2	1.23
7	dampness heat closed lung syndrome	Magnolia officinalis	0.73	0.18	1.56
8	dampness toxin closed lung syndrome	Pogostemon cablin	0.71	0.11	1.68
9	dampness toxin closed lung syndrome	Pinellia ternata	0.71	0.11	1.88
10	dampness toxin closed lung syndrome	Scutellaria baicalensis	0.71	0.11	1.52
11	dampness toxin closed lung syndrome	licorice	0.71	0.11	1.06
12	cold dampness closed lung syndrome	Pogostemon cablin	0.67	0.18	1.59
13	dampness heat closed lung syndrome	Pogostemon cablin	0.64	0.16	2.06
14	dampness heat closed lung syndrome	Amomum tsao-ko	0.64	0.16	1.92

4. Discuss

4.1 Etiology, pathogenesis and syndrome analysis of mild and common novel coronavirus pneumonia

COVID-19 belongs to the category of epidemic disease in the field of traditional Chinese medicine, with the characteristics of rapid pathogenesis, infectivity and epidemic. Studies have

shown that the main causative factors of new corona pneumonia include cold, wet, heat, toxin, and stasis as well as deficiency of Qi, which is known from the distribution of syndromes, and that the mild form as well as the common new corona pneumonia syndrome type mainly consists of cold wet lung with dampness heat syndrome, followed by dampness toxic lung. Fei Tong weather, is when Jiao dirty and new crown pneumonia outbreaks, the positive value of Wuhan is Yin rain sponge, wet evil invades into the body of cold and cold heat, causing cold or damp heat Yunyu people. The characteristic features of the disease mechanism are mainly the invasion of external evil, chills and fever are false and seen, the course of the disease is day and day long and tangles, mainly involving the lungs and spleen and stomach and other Fu organs, and the treatment of the disease is "to expel external evil and peri toning Qi", and the treatment method can be applied by Wenyang Fuzheng Hua drinking and dissipating cold and dampness to detoxify[3].

4.2 High-frequency drug analysis and core prescription analysis

Through the analysis of traditional Chinese medicine (TCM) frequency statistics and complex network analysis found that the new crown pneumonia of traditional Chinese medicine to treat light and normal in the majority with heat drying wet phlegm drugs, mainly includes the licorice, radix scutellariae, bitter almond, ephedra, Pinellia ternata, Pogostemon cablin, radix bupleuri, rhizoma atractylodis, poria cocos, such as drugs, heat, drying dampness, phlegm, reflected light and ordinary new crown pneumonia evil is real characteristics. Among them, the application frequency of licorice is the first. In addition to being an auxiliary medicine and herbal medicine, licorice can also clear heat, detoxize, antitussive and expectorant. Modern studies have shown that glycyrrhizin, glycyrrhizin and glycyrrhizin A contained in licorice have good antiviral effects, glycyrrhetinic acid can effectively relieve cough and asthma, and glycyrrhizin, isoglycyrrhizin and glycyrrhizin F and other components have good anti-inflammatory effects[4]. Baicalein can clear heat and dry dampness, reduce fire and detoxify, and effectively clear the dampness and heat of lung and stomach. Studies have shown that baicalein can inhibit the apoptosis of E2 (PGE2) and NO, and improve the expression level of COX-2 protein, so as to achieve the anti-inflammatory effect[5]. Chemical substances such as patchouli oil and water extract contained in Pogostemon cablin, organic acids contained in Pinellia, and water extract of gingerite Pinellia have good antitussive and expectorant effects[6-7], and are widely used in the treatment of common COVID-19. Both Atractylode rhizoma and Poria cocos have the function of invigorating the spleen. "When evil qi is combined, its qi will be deficient". By invigorating the spleen and enhancing the healthy qi of the human body, it can play a good preventive role in the occurrence of COVID-19. In addition, rhizoma atractylodis inside of rhizoma atractylodis lactone, rhizoma atractylodis ketone composition such as good anti-inflammatory and antiviral, its rhizoma atractylodis ketone for protection and restoration of lung injury also has the good function[8]. Bupleurum and soothing the liver and relieving depression can inhibit the NF-κB signaling pathway and reduce the expression of pro-inflammatory cytokines, so as to play an anti-inflammatory role[9]. Epizhuang, bitter almond, coix seed and licorice are the popular recipes of Maxingyigan Decoction. Studies[10] have shown that IL-6, the core protein in Maxingyigan decoction, can affect the signaling pathways such as AGE-RAGE, IL-17 and TNF, so as to have a good effect on COVID-19.

4.3 Analysis of drug flavor by channel

The four qi attributes of drugs used in the treatment of mild and common COVID-19 were mainly warm (326 times), cold (206 times), and clam (176 times). Tong Xiao-lin[11]et al believed that the COVID-19 belonged to the category of "cold-dampness epidemic". Cold resistance of the product can be heat purging fire, cooling blood detoxification, in addition, Jin Li[12]and others

through the study found that cold sex of Chinese herbal medicine and antiviral efficacy were positively correlated, cold resistance of product is the advantage of the established antiviral factor; It has the characteristics of "neutralizing, without bias of miscellaneous damage", mild effect, and can supplement and heal, and is widely used in the treatment of mild and ordinary COVID-19. The five flavors involved mainly included simba (544 times), bitterness (481 times) and gump (392 times). simba herbs mostly contained volatile oil and had good functions of dispersing pathogenic factors on the surface and driving cold from the inside. Bitter medicine has the function of releasing heat, drying dampness, and strengthening Yin, and opening bitter and lowering, which not only diverges the surface evil, dries dampness evil, but also adjust the Middle focus to eliminate the poison of plague. At the same time, it is combined with gump products to supplement and reconcile the drug. The meridians mainly involve the lungs, stomach, spleen and other viscera, and the disease is transmitted by the respiratory tract. The lungs are the main skin, which is the main site of the onset of COVID-19. Drugs that enter the lung can directly reach the disease site. In addition, clinical studies have shown that some common COVID-19 patients are accompanied by digestive system symptoms such as loose stool in addition to respiratory symptoms. The application of drugs into the spleen and stomach meridian can relieve the symptoms.

4.4 Drug cluster analysis

According to the cluster analysis of the top 20 drugs in descending order of application frequency, the drugs were divided into 3 major clusters: $C_{20}1$ included licorice, Scutellaria baicalensis and radix bupleuri, all of which belonged to the lung meridian. The main functions of these three drugs were clearing heat, drying dampness and eliminating phlegm, and resolving the external and internal aspects, which were used for the syndrome of dampness and heat obstructing the lung. $C_{20}2$ drugs include coix seed, reed root, Forsythia suspensa and Platycodon grandiflorum. Studies have shown that in addition to cold, dampness, toxin, and deficiency, blood stasis also plays an important role in the development of COVID-19. Xiao-li xu[13] and others found that most of the new champions league imaging findings for irregular ground glass shadow, pneumonia patients in clinical with nodules, pulmonary consolidation and "aura", $C_{20}2$ traditional Chinese medicine compatibility can be declared with wet lung expectorant, also can achieve clear heat fights anti good effect. $C_{20}3$ includes gypsum, bitter almond, ephedra, Pogostemon cablin, rhizoma atractylodis, magnolia officinalis, Amomum tsao-ko, betel nut, Pinellia ternata, Poria cocos, pericarpium citri reticulatae, Atractylodes macrocephala, and ginger. Among them, the gypsum, bitter almond, and ephedra decoction contains Maxing Shigan decoction, which is used to treat the syndrome of high fever, cough and asthma caused by COVID-19. In addition, modern studies have shown[14] that Maxing-Shigan Decoction can up-regulate spleen index, down-regulate lung index, and effectively reduce lung and colon tissue damage by inhibiting the activation of JAK1/2-STAT1 signaling pathway. Pogostemon cablin, Magnolia officinalis, Amomum tsao-ko, Amomum tsao-ko, ginger, pericarpium citri reticulatae and Pinellia ternata can be used to treat the syndrome of dampness and phlegm of COVID-19. The combination of rhizoma atractylodis, Poria cocos and Atractylodes macrocephala can play the functions of drying dampness and resolving phlegm, invigorating spleen and invigorating qi.

5. Conclusion

To sum up, traditional Chinese medicine treatment of light as well as the method of ordinary new crown pneumonia is given priority to with wet nourish, heat, eliminating phlegm to smooth wheezing, both the spleen and stomach, complementing the vigour. The high-frequency drugs mainly included licorice, scutellaria baicalensis, bitter almond, Ephedra, etc. The nature and taste

were mainly related to warm, cold, and hard sweetness, and the meridians were mainly related to lung, stomach, and spleen. In the process of clinical application, the four diagnosis and treatment should be combined, syndrome differentiation and treatment should not be restricted to the frequency of drugs. In this study, the ancient and modern medical record cloud platform (V2.3.5) was used to mine and analyze 87 prescriptions of mild and common COVID-19 treated with traditional Chinese medicine, and to sort out their prescription and medication rules, in order to provide reference for clinical treatment and application.

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