

The role played by traditional Chinese medicine in preventing and treating COVID-19 in China

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Abstract Traditional Chinese medicine (TCM), an ancient system of alternative medicine, played an active role in the prevention and control of COVID-19 in China. It improved the clinical symptoms of patients, reduced the mortality rate, improved the recovery rate, and effectively relieved the operating pressure on the national medical system during critical conditions. In light of the current global pandemic, TCM-related measures might open up a new channel in the control of COVID-19 in other countries and regions. Here, we summarize the TCM-related measures that were widely used in China, including TCM guidelines, the Wuchang pattern, mobile cabin hospitals, integrated treatment of TCM and modern medicine for critical patients, and non-medicine therapy for convalescent patients, and describe how TCM effectively treated patients afflicted with the COVID-19. Effective TCM therapies could, therefore, be recommended and practiced based on the existing medical evidence from increased scientific studies.

Keywords traditional Chinese medicine; COVID-19; Wuchang pattern; mobile cabin hospital; convalescent patients; three formulae and three medicines

Introduction

The COVID-19 pandemic is rampant and has created global panic. As of 10 a.m., May 27, 2020, Central European Time, 5 488 825 patients were diagnosed with COVID-19 and the death toll was 349 095 [1]. China was one of the countries with the largest number of cumulative confirmed cases. However, owing the effective prevention and control strategies laid down by the Chinese government for the country, the COVID-19 epidemic in China is now almost under control and very few new native cases have been detected [2]. Apart from isolating and treating diagnosed patients, tracking and isolating their close contacts, suspending public gatherings, and restricting population movements, robust traditional Chinese medi-

cine (TCM)-related measures were also used to combat the epidemic. As of March 23, 2020, a total of 74 187 diagnosed patients, accounting for 91.5% of the infected population, had used TCM in China, and more than 4900 TCM practitioners and staff, accounting for 13% of the medical professionals, offered their services in Hubei [3]. Therefore, TCM played a major role in the prevention and control of COVID-19 in China.

TCM is one of the three major traditional medicines in the world, which not only occupies a vital role in China's national medical system, but also has gained popularity globally. The 72nd session of the World Health Assembly reviewed and approved the Eleventh Revision of International Classification of Diseases (ICD-11), in which the chapter of traditional medicines originating from TCM was first included [4]. As of 2019, 183 countries and regions have emerged or used TCM. In the face of the new pandemic, the role of TCM in recognizing and treating COVID-19, and China's experience with TCM that can benefit other countries are important aspects that warrant discussion. In this study, we systematically introduce a

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series of TCM-related measures which were used to prevent and control COVID-19 in China. We explain the principle of TCM, extend its applications to the treatment of COVID-19, and recommend effective Chinese medicines and formulations with an aim to provide ready strategies for epidemic control worldwide.

Recognizing and treating COVID-19 using TCM

TCM's understanding of disease

Before understanding how TCM treats COVID-19, we first need to understand how TCM recognizes and treats diseases. The system of TCM is based on the principle that the emergence of diseases in the human body is due to insufficient vital qi, resulting from its infringement by pathogenic factors, and consequently leading to disorders in the physiologic functions of the body. Vital qi is a desirable trait, representing the ability and the energy of the body to fight diseases, and can be broadly defined using scientific terms such as immunity, internal environment homeostasis, body fluid balance, mental health, etc. At the same time, the pathogenic factors are the undesirable traits, which represent the ability and energy of extraneous factors to cause diseases. These factors include bacteria, viruses, microorganisms, emotional disorders, radiation, aging, or even environmental factors such as the wind and temperature. If the vital qi is unable to combat this invasion of pathogenic factors, the human body succumbs to the disease condition. Based on its unique traditional theories such as yin and yang, the five elements, viscera, meridians, etc., therapy with TCM can regulate the internal environment of the body, enhance immunity, destroy pathogens, eliminate pathological metabolites, and restore the body's metabolic balance. This restoration, which results in the treatment of the disease state, can be achieved through media such as herbal medicines, acupuncture, and massage.

Recognizing COVID-19 based on "Plague theory"

When an epidemic occurs, TCM do not care about the nature of the pathogen, but about the symptoms that the human body shows after being infected with the pathogen. When severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infects the human body, the body's vital qi cannot adequately resist the interference of this pathogenic factor; this results in a series of symptoms such as fever, dry cough, fatigue, tightness of the chest, etc., indicating bodily dysfunction. The strength of the vital qi determines the severity of the illness following the viral infection. Therefore, middle-aged and older adults with reduced vital qi are more likely to succumb to the infection. Their

clinical manifestations are more severe and the mortality rate is higher than the younger patients afflicted with the virus. On the contrary, clinical manifestations are mostly mild in younger patients who possess sufficient vital qi. Research shows that 90% of diagnosed patients are over the age of 30 years and the mortality rate of people over the age of 80 years is as high as 14.8%, which far exceeds the overall mortality rate (2.3%) [5]. Besides, acute infectious diseases similar to COVID-19 have been treated using TCM, which have special features compared with the occurrence and development of conventional diseases, such as the pathogenic factor causing COVID-19 is more infectious, so that the population is generally susceptible, and the symptoms deteriorate faster after infection, which can be life-threatening within a few days. Therefore, in ancient China, TCM practitioners developed a unique "Plague theory," to combat acute infectious diseases.

"Plague" is a general medical term used in the practice of TCM to define acute infectious diseases including smallpox, severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), Ebola virus disease, and COVID-19, among others. Due to wars, droughts, floods, famines, pest infestations, and poor sanitary conditions, epidemics were frequent in ancient China. Statistics reveal that at least 321 infectious diseases with a certain scale have occurred in Chinese history and TCM effectively observe and record the pathogenic regularity and characteristics of these diseases. For example, *Huangdi Neijing*, an ancient Chinese medical text, which is more than two thousand years old, describes the characteristics of epidemics as follows: "A variety of infectious diseases can be transmitted from person to person. Regardless of the age of the person, the symptoms are similar." During the Ming and Qing dynasties, epidemics occurred more frequently. Doctor Wu Youke proposed the etiological viewpoint of "Li qi" in epidemics, emphasizing that pathogenic factors entered the body through the mouth and nose.

TCM's treatments for COVID-19

Based on the "Plague theory," the treatment of COVID-19 using TCM employed three main steps. The first step was a TCM-based prophylactic treatment that was commenced for a large number of suspected cases and their close contacts, to reduce the possibility of infection and to disrupt the spread of the epidemic. Second, the patients who were confirmed to be infected were started on a timely and staged treatment with TCM-therapy to prevent their condition from further deterioration. This step helped reduce the chances of patients exhibiting mild symptoms from becoming severe, and reduce the fatality rate in patients exhibiting severe symptoms. This step was called "prevention of disease deterioration." Finally, for the convalescent patients (negative RT-PCR test results) who

were clinically cured and met the quarantine release standards, comprehensive interventions of TCM-therapy including herbs, moxibustion, physical exercise, etc., were provided to promote complete recovery and to avoid the possible recurrence of COVID-19. This step was called “prevention of relapse after recovery.” Based on these three steps, China has formulated a systematic TCM-centric program for the diagnosis, treatment, and relapse-prevention of COVID-19 in patients who are under medical observation and in the convalescent phase.

COVID-19 prevention and treatment measures in China using TCM

Diagnosis and treatment scheme using TCM

Following the outbreak of COVID-19, the Chinese government sent several accomplished TCM practitioners and three academicians to Wuhan, China, the worst-hit city, to initiate prophylaxis as well as treatment using TCM. The expert group established a treatment regimen to treat COVID-19 using the principles of TCM. Through field investigation of fever clinics, emergency observation rooms, and isolation wards in designated hospitals in Wuhan, the group developed a primary diagnosis and treatment scheme. This method used the universal formula, Chinese medicinal compounds, patented Chinese medicines, and Chinese-medicine injectables. This scheme was released as a part of the Chinese national COVID-19 clinical guidelines. With an increase in the understanding of the disease, the TCM scheme was constantly updated and improved. Between the third edition of the national medical guidelines issued on January 22 and the seventh edition of the national medical guidelines issued on March 3, 2020, the consensus on the diagnosis and treatment of COVID-19 using TCM has been revised three times. The latest TCM treatment scheme requires the following conditions to be fulfilled [6]: (1) the TCM-based classification of disease stages should be consistent with the clinical classification of western medicine and the diagnosed patients should be categorized under mild, moderate, severe, critical, or convalescent cases; (2) recommended TCM syndrome types, formulations, and dosages will be based on the clinical experience of the experts and evidence-based studies; (3) a medical observation facility will be set up for suspected cases and a preventive plan using TCM-therapy will be used as prophylaxis; (4) intravenous injections of Chinese medicine are recommended for severe and critical cases of COVID-19, which are to be prescribed by the medical practitioners of TCM; (5) a TCM protocol will be provided for convalescent patients who meet discharge standards but still have impaired lung function, pulmonary fibrosis, fatigue, poor appetite, constipation, or other symptoms.

The latest edition of diagnosis and treatment guidelines using TCM provides practical prevention and treatment strategies, which in combination with western medicine could be beneficial to other countries in the world in combating COVID-19.

Wuchang pattern

Numerous outbreaks, the lack of effective drugs and vaccines, a severe shortage of medical resources, and the collapse of healthcare systems are common challenges experienced in hard-hit areas. This unfavorable situation is detrimental and a hurdle in the prevention and control of the epidemic. To solve this problem, the leader of the Chinese national TCM medical treatment expert group, Academician Xiaolin Tong, referred to the ancient anti-epidemic history of TCM, comprehensively analyzed the epidemic situation of COVID-19, and suggested distributing the universal TCM formula in the country to help as many patients as possible. He hypothesized that commencing TCM promptly would help decrease the rapid spread of the epidemic and provide the much-needed additional time for the health system to resume normalcy. This idea gave birth to the “Wuchang pattern,” based on the framework of government support, community operation, treatment with the universal formula, and an information support system.

To begin with, a universal formula was formulated based on the national diagnosis and treatment guidelines. This was followed by the government’s instructions directing the Chinese medical enterprises to rapidly manufacture and distribute the prescribed formulations to remote areas. Patients, community medical staff, expert groups, volunteer physician teams, and administrators could communicate through the APPs and the internet to transmit and exchange real-time information such as treatment plans, changes in patient condition, reflection after taking medication, and volunteer guidance, so that patients could be managed effectively. The large amount of medical data generated during the diagnosis and treatment process provided powerful support for evaluating the clinical efficacy of TCM therapy, adjusting national guidelines, and formulating government decisions. Since this pattern was first implemented and gradually promoted in the Wuchang District of Wuhan City, it is called the “Wuchang pattern” [7].

The “Wuchang pattern” has been well applied and promoted in China. As of March 2, 2020, the universal formula drafted by Tong was successfully distributed to 702 000 pairs; 11 000 patients were managed online, and more than 680 physicians volunteered their services. According to clinical observations, the common symptoms such as cough, fatigue, and fever subsided on the third day in more than 90% of the 3698 people when the indicated formulation was commenced. On an average, 1.74 days

were required for the fever to subside after taking the drug and the deteriorating rate was significantly lower than patients who have not taken. These data suggest that using the universal TCM formula as a treatment modality in the country had a positive outcome in controlling the spread of COVID-19. According to social evaluation, the “Wuchang pattern” was an innovative model of community prevention and control of the virus during the new, major public health emergency. Before the emergence of vaccines and specific medical therapies, TCM guidelines can therefore be used as a valuable means to characterize the disease, followed by treatment with the universal formula, in an attempt to combat the epidemic and prevent its spread.

Mobile cabin hospitals

Large indoor spaces such as gymnasiums, exhibition halls, and school classrooms were temporarily converted into medical facilities, dedicated to the treatment of patients exhibiting mild symptoms of COVID-19. These were called mobile cabin hospitals. In Wuhan, China, 16 such hospitals were built, one of which was a Chinese-government approved cabin hospital to conduct pilot studies using TCM. The medical staff consisted of 209 TCM experts across China. In this hospital, comprehensive treatment based on TCM was used for mild- and moderate category of patients according to the Chinese medical diagnosis and treatment plan. Since the operation of the cabin hospital from February 14, 2020, a total of 564 mild- and moderate category patients with COVID-19 have been treated, of whom 392 have been discharged. None of the admitted patients progressed to the severe-type, and no infection was detected among the medical staff either [8]. Compared to mobile cabin hospitals using non-TCM protocols, the treatment of mildly symptomatic patients using TCM had a higher recovery rate and a lower deterioration rate, indicating the efficacy of TCM on mild-type COVID-19 patients.

Treatment of critical patients using an integration of Chinese and western medicines

For the treatment of critical patients, modern medicine was primarily used. Supplementing modern medicine with TCM therapy helped patients benefit more. This combination was also helpful in solving some clinical challenges experienced in modern medicine, such as blocking severe to critical, reducing high fever, relieving shortness of breath, improving gastrointestinal and circulatory functions, reducing cytokine storm syndrome, and boosting immunity in critical patients. This integration also helped reduce the mortality of COVID-19 patients to a certain extent. Some critically ill patients experienced symptoms of abdominal fullness and constipation when ventilated, which is detrimental to the oxygen-inhalation treatment. In

such patients, the use of TCM reversed constipation, emolliated their stools in a short time, and significantly improved the effects of oxygen inhalation [8]. After being injected Reduning [9,10], Tanreqing [11,12], and other injections indicated in TCM that display a synergistic effect with antibiotics, many patients who displayed a poor response to lung infection or a delayed response to inflammation using the antibiotics alone, were cured. Therefore, TCM combined with modern medicine may yield better results in critically ill patients.

Treatment of convalescent patients using non-medicine therapy

Some patients, who had recovered from COVID-19, still had slight cough, sweating, fatigue, shortness of breath, and other uncomfortable symptoms, and pulmonary fibrosis was a common pathological change [13]. A few patients even had a fever again and were retested positive for COVID-19 with the real-time reverse transcription-polymerase chain reaction (RT-PCR) assay [14]. Therefore, continuous medical intervention and psychological rehabilitation are required in the recovery period. TCM believes that qi deficiency is the core pathogenesis of patients in the recovery period, which is the result of the fight between the body's vital qi and the pathogen. TCM can provide comprehensive rehabilitation interventions including medicines and non-medicine therapies, such as acupuncture, massage, cupping, traditional exercises, diet, psychological intervention, etc., to promote the recovery of convalescent patients. Based on these therapies, the Chinese government has formulated a standard treatment scheme specifically for patients in the recovery period, *Recommendation on the Rehabilitation Guidance of Traditional Chinese Medicine for Coronavirus Disease in the Recovery Period* [15], to guide and standardize the clinical treatment of patients in recovery period. Studies have shown that comprehensive TCM interventions not only improve uncomfortable symptoms, but also reduce the risk of positive retest result [16].

The role of TCM on COVID-19

Studies have proved that TCM has a definite role in the treatment of COVID-19. After screening several existing Chinese medicines, the following patented Chinese medicines and formulae were selected: Jinhua Qinggan granules, Lianhua Qingwen capsules, Xuebijing injection, Qingfei Paidu decoction, Huashi Baidu decoction, and Xuanfei Baidu decoction. This selection of “three formulae and three medicines” has proven to be effective in patients afflicted with COVID-19, and is therefore recommended for use in the prevention and control of the epidemic globally.

Patented Chinese medicines

Lianhua Qingwen capsules

Lianhua Qingwen is a formulation prepared using the classical compounds Ma Xing Shi Gan Decoction and Yin Qiao San from ancient China. It is composed of 13 Chinese medicines including Lian Qiao (*Fructus Forsythiae*), Jin Yin Hua (*Flos Lonicerae*), Ma Huang (*Ephedrae Herba*), Xing Ren (*Armeniacae Semen*), and Shi Gao (*Gypsum Fibrosum*), etc. It is a commonly used patented Chinese medicine indicated in the treatment of common colds and influenza. A prospective multicenter open-label randomized controlled trial of 284 mild and moderate cases of COVID-19 patients showed that Lianhua Qingwen could improve the symptoms of fever, cough, and fatigue, and the median time to symptom recovery was markedly shorter in treatment group [17]. And it was reported that Lianhua Qingwen prevented the aggravation of moderate cases of COVID-19 to the severe forms [18]. Three retrospective studies involving 126 SARS-CoV-2-positive patients conducted in Wuhan's hospitals showed that using Lianhua Qingwen as a routine treatment (nutrition support treatment, antiviral treatment, and antibacterial treatment according to the patients' condition) led to a rapid improvement of fever, fatigue, cough, tightness in the chest, and poor appetite, and lowered the incidences of mild and moderate cases from turning severe [19–21]. Besides, it was found that Lianhua Qingwen could inhibit the replication of SARS-CoV-2, affect the viral morphology, and exert anti-inflammatory activity *in vitro* [22].

Jinhua Qinggan granules

Jinhua Qinggan granule is a patented Chinese formulation, which was developed for the treatment of influenza A (H1N1) in 2009. It consists of 12 Chinese medicines including Jin Yin Hua (*Flos Lonicerae*), Bo He (*Menthae Haplocalycis Herba*), and Gan Cao (*Glycyrrhizae Radix*), etc. A controlled study in 123 patients showed that Jinhua Qinggan in combination with routine treatment could significantly and rapidly improve symptoms including fever, cough, fatigue, and expectoration, and also improve the patient scores on the Hamilton anxiety scale. The hospitalization rate of the experimental group was only 10.98%, while that of the control group was 24.39%. Jinhua Qinggan cannot only improve common clinical symptoms in patients, but can also alleviate their psychological anxiety [23]. Studies suggest that the active components in Jinhua Qinggan regulate multiple signaling pathways via binding to ACE2 and consequently act on targets such as PTGS2, HSP90AB1, HSP90AA1, PTGS1, and NCOA2 and thus help prevent COVID-19 [24].

Xuebijing injection

Xuebijing injection, a patented Chinese medicine developed and marketed for the treatment of SARS in China, is composed of the extracts of 5 Chinese herbs, namely, Hong Hua (*Carthami Flos*), Chi Shao (*Paeoniae Radix Rubra*), Chuan Xiong (*Chuanxiong Rhizoma*), Dan Shen (*Salviae Miltiorrhizae Radix and Rhizoma*), and Dang Gui (*Angelicae Sinensis Radix*). This injection is indicated for systemic inflammatory response syndrome induced by infections. A randomized controlled clinical trial in a cohort of 710 patients with severe cases of pneumonia with sepsis confirmed that the combination of Xuebijing injection and a common anti-infective could significantly reduce the mortality in patients with severe pneumonia, improve their pneumonia-severity index, and shorten the duration of mechanical ventilation and length of ICU stay [25]. In the treatment of severe and critical cases, clinical studies showed that the combined use of Xuebijing injection and western medicine improved the recovery and discharge rate of COVID-19 patients and reduced the incidence of severely ill patients from worsening to critically ill. Experimental research indicates that this formulation exhibits antiviral effects *in vitro*. Results suggest that this formulation can significantly inhibit inflammatory factors induced by SARS-CoV-2 infections. Apart from reducing inflammatory reactions and preventing cytokine storms, Xuebijing also exhibited antithrombotic functions, which could prevent vascular embolism caused by COVID-19 [18].

Chinese herbal compounds

Huashi Baidu decoction

The Huashi Baidu Decoction is composed of 14 TCMS including Ma Huang (*Herba Ephedrae*), Xing Ren (*Armeniacae Semen*), Shi Gao (*Gypsum Fibrosum*), Huo Xiang (*Pogostemonis Herba*), Hou Po (*Magnoliae officinalis Cortex*), and Da Huang (*Rhei Radix et Rhizoma*). This decoction is capable of providing immunity against viral infections, reducing inflammation, and enhancing immunity. Thus, the Huashi Baidu decoction is suitable for treating patients exhibiting mild, moderate, and severe symptoms of COVID-19. Studies have confirmed that this formulation can be effective as a multi-target comprehensive treatment regimen in SARS-CoV-2-positive patients and can significantly shorten the time to nucleic acid turning to negative. In addition, it can reduce the average length of hospitalization and significantly improve clinical symptoms, which can be detected using physical and chemical examination methods, as well as pulmonary CT imaging studies. Additionally, Huashi Baidu could reduce the viral load in lung tissue by 30% in a mouse model. The

National Medical Products Administration has officially approved Huashi Baidu granules for clinical trials [26].

Qingfei Paidu decoction

Qingfei Paidu decoction comes from Ma Xing Shi Gan decoction, Xiao Chai Hu decoction, Wu Ling San, and other classic TCM formulae. It consists of 21 Chinese herbal medicines and is suitable for patients exhibiting mild, moderate, and severe symptoms of COVID-19. It resolved fever, cough, and fatigue, rapidly and effectively, and also improved the outcome of lung pathogenesis in patients exhibiting severe symptoms of COVID-19. The changes in lung pathogenesis was confirmed via imaging studies. In an initial study, 214 SARS-CoV-2-infected patients were treated with Qingfei Paidu decoction in a pilot study in 4 provinces in China, over a treatment course lasting 3 days. The efficacy of this decoction was over 90%, and the symptoms in more than 60% of patients improved [27]. As a result, Qingfei Paidu decoction was introduced into China's *National Diagnosis and Treatment Protocol for COVID-19* and has become the first recommended universal treatment method in TCM therapy. As of March 23, 2020, the Qingfei Paidu decoction has been used in 28 provinces and cities in China and demonstrated positive outcomes. A total of 1265 patients with COVID-19 were observed in 66 designated hospitals in 10 provinces outside Hubei, and none of the patients that exhibited mild or moderate symptoms worsened to critical conditions. Of the 1265 patients, 1241 (98%) were cured and subsequently discharged. Additionally, 57 patients who displayed severe symptoms were given Qingfei Paidu decoction, and none of them experienced a deterioration of their existing condition. Less liver or kidney injury was found in patients who were cured and discharged [28].

Xuanfei Baidu formula

Xuanfei Baidu was created on the basis of classic decoction formulae including Maxing Shigan, Maxing Yigan, Tingli Dazao Xiefei, and Qianjin Weijing. It includes 13 Chinese herbal medicines such as Ma Huang (Ephedrae Herba), Xing Ren (Armeniacae Semen), Shi Gao (Gypsum Fibrosum), Huo Xiang (Pogostemonis Herba), and Qing Hao (Artemisiae annuae Herba), etc., and was indicated for the treatment of mild and moderate cases of COVID-19. Studies show that this formula effectively shortens the improvement time of clinical symptoms and temperature spikes. It also reduces the average length of hospitalization and prevents the worsening of symptoms in mild- and moderate category of patients to a certain extent. A clinical study conducted in the Wuhan Hospital of Traditional Chinese Medicine and

the Hubei Province Hospital of Integrated Chinese and Western Medicine, showed that the group receiving Xuanfei Baidu formula ($n = 70$) displayed a significant reduction in inflammation and an improvement in lymphocyte count as compared to the control group ($n = 50$). The lymphocyte count in the Xuanfei Baidu group increased by 17% while the recovery rate increased by 22% [18], when compared to the control group. It was found that Xuanfei Baidu interfered with the biological processes related to the onset and development of COVID-19, reduced inflammation and improved hepatobiliary and other metabolic functions. This formulation was useful in developing immunity, reducing inflammation, combating viral infection by reducing viral protein transcription, regulating hepatobiliary metabolism, and restoring the energy and metabolism balance [29].

Instructions and suggestions

Limitations

Contrary to the requirements of the medical ethics body, there were no large-scale clinical studies conducted on SARS-CoV-2-positive patients in China using TCM alone. Most patients enrolled in the clinical studies cited in this study used TCM combined with other medical modalities including nutritional support, antiviral agents, antibacterial drugs, symptomatic support systems, and pharmacological agents for comorbidities. Owing to the novelty of this pandemic and an urgency to develop a suitable treatment model, a long-term research study on the efficacy and safety of TCM has not been performed yet, and therefore our study requires to be corroborated by additional medical evidence. A considerable amount of literature cited in this study were obtained from reports generated by the Chinese government and the mainstream media.

The principle of adaptation to local conditions

TCM is a medical system that emphasizes the need for personalization, which involves development of individual treatment plans based on the patient's condition, age, gender, season of onset of the ailment, and geographic location, among other attributes. Therefore, a treatment regimen based on TCM could vary between countries, practitioners, and patients. Based on the diagnosis of the disease condition, professional physicians are expected to design a treatment plan based on the actual clinical manifestations of the patient, while considering the parameters discussed earlier.

Safe use of TCM

To ensure safety in the use of TCM, the Chinese

government has formulated a series of laws and regulations. These include the TCM Law of the People's Republic of China, and the Chinese Pharmacopeia. China has also set up a scientific research center to establish a full-chain supervision system to cover all aspects concerning the quality of TCM, and ensure that this treatment modality is appropriately used keeping in mind the stringent guidelines and policies. In addition to the local laws and regulations, we advocate a similar supervision system for the use of TCM worldwide. It is recommended to use authentic and legally-marketed products under the guidance of professional TCM practitioners. If adverse reactions such as nausea, vomiting, dizziness are experienced, patients should either contact their family physician, or seek medical help from the local emergency department promptly.

Conclusions

Following the outbreak of COVID-19, TCM has been useful as a branch of alternative medicine to provide several strategies in combatting this lethal disease owing to its ancient and seasoned anti-epidemic history and a unique system of healing. When an outbreak occurs, this system of medicine can be used promptly to assess symptoms via clinical analyses and to determine a suitable regimen to commence clinical treatment. The TCM modality was indicated as the first-line of therapy for COVID-19 patients exhibiting mild and moderate symptoms. Patients categorized under the severe and critical symptomatic groups were treated using a joint treatment modality designed by TCM practitioners and modern medicine experts, in order to increase therapeutic benefits. In convalescent patients, herbal medicine, acupuncture, massage, and other methods were used to promote recovery. A large number of clinical data and observations showed that the active use of the TCM modality had effectively prevented the spread of COVID-19 in China, thereby indicating the advantage of China's unique medical system. The current global epidemic situation is grim. In the absence of effective vaccines and targeted therapies for the treatment of COVID-19, this unique system of TCM has opened a new avenue to fight the novel pandemic.

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Compliance with ethical guidelines

Qingwei Li, Han Wang, Xiuyang Li, Yujiao Zheng, Yu Wei, Pei Zhang, Qiyong Ding, Jiaran Lin, Shuang Tang, Yikun Zhao, Linhua Zhao, and Xiaolin Tong declare that they have no competing interests. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the *Helsinki Declaration* of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

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