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•Review•

Traditional Chinese Medicine: an effective treatment for 2019 novel coronavirus pneumonia (NCP)

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[ABSTRACT] The novel coronavirus pneumonia broke out in 2019 and spread rapidly. In 30 different countries, there are over seventy thousand patients have been diagnosed in total. Therefore, it is urgent to develop the effective program to prevent and treat for the novel coronavirus pneumonia. In view of Traditional Chinese Medicine has accumulated a solid theoretical foundation of plague in ancient and recent decades. Meanwhile, Traditional Chinese Medicine can provide the more effective and personalized treatment via adjusting the specific medicine for each patient based on the different syndromes. In addition, TCM often has different effect on the distinct stages of diseases, contributing to the prevention, treatment and rehabilitation. Nowadays, TCM has exhibited decent effect in the fight against NCP. Therefore, it is convinced that Traditional Chinese Medicine is an effective treatment for 2019 novel coronavirus pneumonia.

[KEY WORDS] Traditional Chinese Medicine; Novel coronavirus pneumonia; Novel coronavirus (2019-nCoV); Infectious diseases; Inflammation

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Introduction

In December 2019, an unknown virus pneumonia broke out in Wuhan China. Later the unknown virus was identified as a novel coronavirus (2019-nCoV) and the unknown pneumonia named as novel coronavirus pneumonia (NCP) by Chinese government and scientists [1]. In early February 2020, over sixty thousand patients have been diagnosed with NCP in 30 different countries all over the world only after 1 month. And 99% of the cases have occurred in China. On account of the NCP reported worldwide for the first time, there is no specific vaccine and drug. Unfortunately, the development of novel vaccine or specific drug will take a few months, cannot keeping up with the development of NCP. Therefore, it is urgent to develop the effective treatment for NCP.

Though it is no time to discovery effective drugs, the therapeutic effect of NCP is still remarkable in hospitals. Partly, this is owing to that Traditional Chinese Medicine

(TCM) is applied in clinic timely as shown in Fig. 1 [2]. After National Health Commission (NHC) of China announcing the emergency situation in 20 January 2020, the National Administration of Traditional Chinese Medicine (NATCM) rapidly deployed the work, and the first batch of Chinese medicine experts arrived in Wuhan city on the day. In 29 January, National TCM Rescue Team took over Wuhan Jinyintan Hospital. Five days later, eight patients were discharged after treatment with Chinese medicine, of which six were critically ill. Similarly, the first patient diagnosed with NCP in Beijing was discharged after a combination of Chinese and Western treatment. According to the NATCM, the total effective rate of certain TCM prescription for NCP is over 90% [3]. Obviously, TCM have been playing a significant role in the combat with NCP.

In fact, TCM played a unique role in the prevention and treatment of emerging infectious diseases since ancient time. For instance, TCM obtained decent clinical effect on SARS (severe acute respiratory syndrome), H7N9 (H7N9 avian influenza) and EVD (Ebola Virus Disease) at one time [4-6]. In these two thousand years, TCM has laid a solid theoretical foundation in the prevention and treatment of infectious diseases *via* the fight against diseases. Furthermore, doctors often adjust the specific treatment for each patient or integrate with western medicine scheme after diagnosing the syn-

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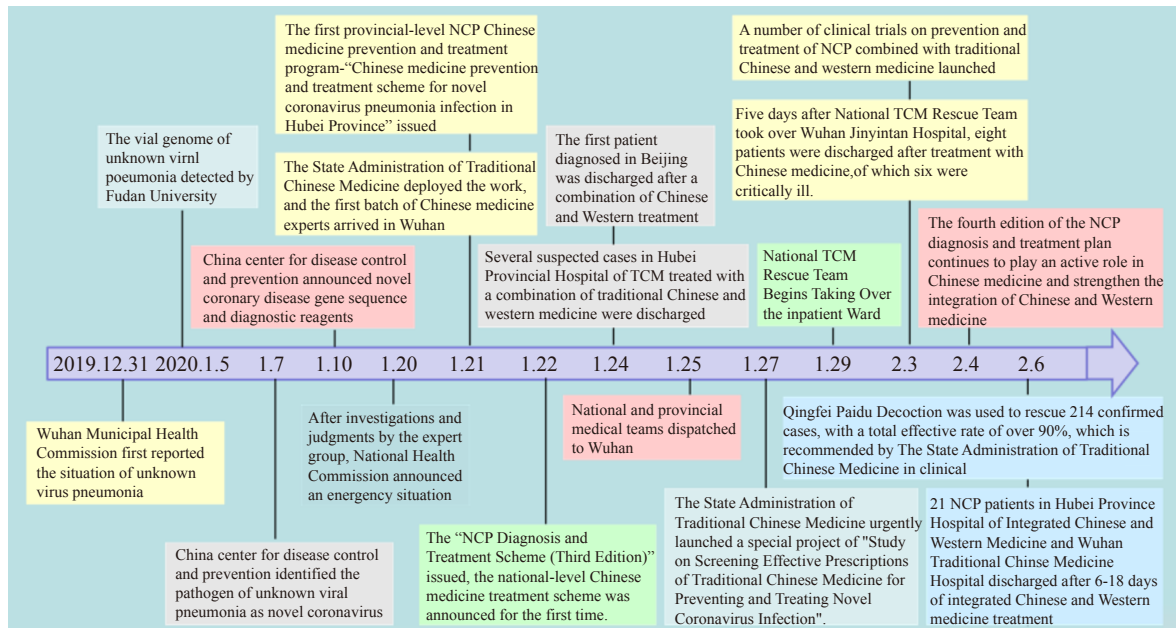


Fig. 1 The actions and treatment of TCM on NCP in China

drome through comprehensive analysis of symptoms and signs. Up to now, TCM has made a big difference in fight against NCP.

The theoretical foundation of TCM for NCP

Though NCP is a novel infectious disease, the similar syndrome infected by coronavirus are not unfamiliar. Firstly, the history of TCM applied for plague has lasted for over two thousand years^[7](Table. 1). And abundant theories of TCM for explosive infectious disease have formed, which have survived as treatises up to now. Meanwhile, TCM also play a significant role in the treatment of these coronavirus pneumo-

nias broke out in the last two decades, such as SARS, MERS and H7N9 avian influenza^[4-6]. Obviously, TCM has accumulated a solid theoretical foundation of plague and will be an effective treatment for NCP.

The theories of TCM for infectious diseases

NCP is infected by the novel coronavirus, but similar infectious diseases are not unacquainted for doctors of TCM. TCM has accumulated a wealth of experience and a lot of prescriptions, laying a solid theoretical foundation (Table 1). Two thousand years ago (BC 1046), the concept of “Yi Bing” was proposed. It pointed out that “Yi Bing” was different from common cold. “Yi Bing” was the disease which has in-

Table 1 The representative theories of TCM for infectious diseases

No.	Data	Book Name	Related theories of TCM for infectious diseases
1	BC 1046 Zhou Dynasty	<i>Zhou Yi</i>	The concept of “Yi Bing” was proposed. It thought that “Yi Bing” was different from common cold. “Yi Bing” was the disease which has infectivity and easily led to epidemic.
2	AD 219 Han Dynasty	<i>Shang Han Lun</i>	The dialectical relationship and treatment theory of exopathogenic disease (“Shang Han”) were elaborated. Especially, decades of specific Chinese herbal formulae were specifically treated different phenotypes of Shang Han.
3	AD 341 Tsin Dynasty	<i>Zhou Hou Bei Ji Fang</i>	<i>Zhou Hou Bei Ji Fang</i> was the first literature of emergency treatment. There were plentiful well proved clinical recipes for emergency including Wen Yi, Shang Han, pestilence and so on.
4	AD 652 Tang Dynasty	<i>Qian Jin Yao Fang</i>	In <i>Qian Jin Yao Fang</i> , there were many discussions on the theory and methods of prevention and treatment of infectious diseases. It also described the prescription drugs in detail.
5	AD 1642 Ming Dynasty	<i>Wen Yi Lun</i>	<i>Wen Yi Lun</i> was the first medical book about systematic study of acute infectious disease in the world. It described the etiology, pathogenesis, syndrome and treatment of plague. “Da Yuan Yin” was the classical prescription for plague.
6	AD 1794 Qing Dynasty	<i>Yi Zhen Yi De</i>	This book dealt with the causes of the plague, the main points of diagnosis and treatment, and the discrimination of common symptoms. The representative prescription “Qin Wen Bai Du Yin” was well recognized.

fectivity and easily led to epidemic. Then the dialectical relationship and treatment theory of exopathogenic disease were elaborated in AD 219. At present, plentiful Chinese herbal formulae from these theoretical foundation have been used. Meanwhile, the theories of TCM for infectious diseases had been further accumulated in Tsin Dynasty and Tang Dynasty. Especially, in as early as the 17th century, China had already owned the world's first medical book about systematic study of acute infectious disease. It described the etiology, pathogenesis, syndrome and treatment of plague. Similarly, a lot of representative theories of TCM for infectious diseases had been established. It is profound that TCM can apply the same method of treatment to patients with different kinds of disease but have the same syndrome. Obviously, TCM also can be an effective treatment for NCP based on these solid theoretical foundations.

The history of treatments for coronavirus pneumonia

NCP is the novel coronavirus pneumonias for TCM. But TCM have been successfully treated for other coronavirus pneumonias such as SARS, MERS and H7N9 avian influenza [4-6]. In 2003, SARS broke out in China. According to statistics, there were 5327 patients diagnosed, and 7% of them died. But in Guangdong, PRC, the fatality ratio was only 3.8% while the mortality in Hong Kong, PRC was 17%, the fatality ratio in Taiwan, PRC was 11% and the fatality ratio in Canada was 14% [8]. The fundamental reason lied in the degree of TCM participation and the timing of its treatment. In Guangdong Provincial Hospital of TCM, 105 patients recovered after the treatment of integration of Chinese and western medicine among of 112 cases, not including 7 deaths from severe heart and brain and other basic diseases [9]. In 2013, H7N9 avian influenza also broke out in China. Then NHC of PRC issued the diagnosis and treatment scheme. In Beijing, the first case was also cured additionally by TCM [10]. Similarly, the Chinese Government also issued the diagnosis and treatment scheme of TCM for MERS in 2015 [11]. Thus it can be seen that TCM have long history of treatments for coronavirus pneumonia. It is believed that TCM also can be treated for NCP effectively.

The effect of TCM on NCP

In the early stages of the outbreak, there is neither standard of western medicine treatment nor targeted drugs owing to the unknown of NCP. However, in these TCM hospital or Integrated Chinese and Western Medicine Hospital, TCM has been widely used for the treatment of NCP (Fig. 1). Importantly, the effect of TCM on NCP is prominent. As shown in Fig. 2, “Qing Fei Pai Du Tang” (QFPDT) is screened out by the National Administration of Traditional Chinese Medicine (NATCM) and widely recommended nationwide [3]. The QFPDT mainly derived from 4 different classical prescriptions originated from *Shang Han Lun*. After treatment of QFPDT, it was reported that the overall response rates were over 90% among of 214 cases in clinic (Fig. 1). In addition, doctors of TCM still will diagnose the syndrome through comprehensive analysis of symptoms and signs, then further

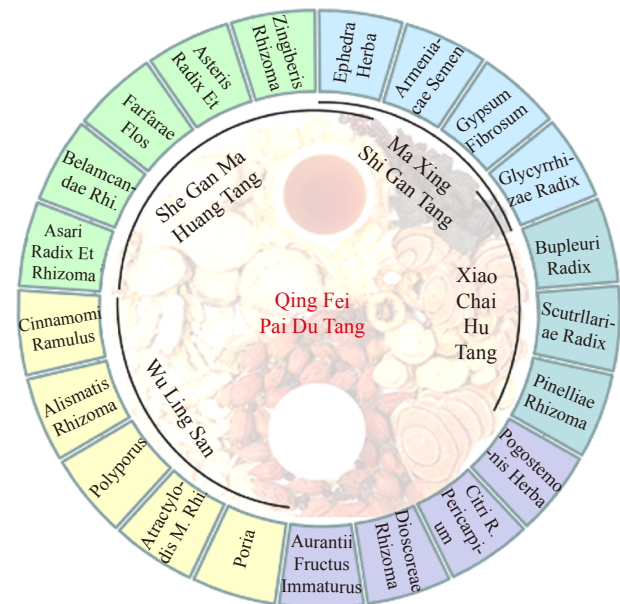


Fig. 2 The composition of the prescription—Qing Fei Pai Du Tang

In total, the prescription contains 21 kinds of Chinese medicine, which mainly derived from 4 different classical prescriptions originated from *Shang Han Lun*: Ma Xing Shi Gan Tang, Xiao Chai Hu Tang, She Gan Ma Huang Tang and Wu Ling San.

adjust the specific treatment for each patient. Therefore, TCM has different effect on the distinct stages of NCP.

TCM prevents infection for healthy person

It is well known that vaccine is the highly effective method to prevent epidemics. Unfortunately, a vaccine will take over half a year from development to approval. Although plentiful research institutes have been carrying on the research of vaccine for NCP, there is no approved vaccine for clinic at present. However, TCM has rich clinical experience in many diseases including infection, plague, emergency and so on as shown in Table 1. Abundant Chinese medicinal formulae and Chinese patent medicine can effectively prevent healthy person from infection. As a number of studies have shown [12-14], TCM can activate immune cells, improve phagocytosis and induce the production of cytokines. Ultimately, TCM enhance the immunocompetence of healthy person preventing infection. In 2003, TCM was successfully applied to prevent SARS in many areas of China. Therefore, a lot of hospitals and Chinese medical specialist have issued prescriptions of TCM for healthy person in defending NCP.

TCM improves symptoms for patients with mild symptoms

According to the current clinical diagnosis [15], patients at an early stage are often with fever, dry cough and fatigue, but part of the patients have suffocating, the existence of lung scattered in the exudation and other symptoms. Luckily, there exists rich clinical experience of improving these symptoms in TCM. During the treatment of NCP, not only these TCM hospitals but also those western medical hospitals almost all adopt TCM treatment plan to improve symptoms. As the the-

oretical foundation, TCM can diffuse the lung, outthrust the pathogen, resolve turbidity with aroma, clear heat, remove toxicity, calm panting and resolve phlegm. Meanwhile, the treatment of TCM also has a better effect on anxiety, restlessness and other emotional problems. Finally, the symptoms were improved and the pathogen was prevented from deteriorating, shortening period of treatment and promoting patient recovery.

TCM controls the state for critical patients

For critical patients with NCP, TCM can alleviate pulmonary effusion, inhibit the release of inflammatory factors, control oxygen saturation, reduce respiratory support and the use of antibiotics^[16]. When critical patients have dyspnea and a significant decrease in oxygen saturation, respiratory support is needed and even invasive mechanical ventilation is required. On the basis of western medicine, intervention of TCM will control oxygen saturation stable, improve dyspnea and inhibit the release of inflammatory factors. Therefore, Shenmai injection, Shenfu injection and Xuebijing injection were widely used in clinical practice. Seriously, the worsening state will often result in the injury of organs and limited therapeutic effect of symptomatic and supportive treatment. At that time, some TCM therapy can clear the heart and open the orifices, tonify qi and yin, extinguish wind and increase humor. At last, TCM improves immune function to protect organ and correct electrolyte disturbance to reduce microcirculation disturbance and tissue fibrosis. In brief, TCM controls the state for critical patients via alleviating pulmonary effusion and inhibiting inflammatory overreaction.

TCM facilitates the rehabilitation process for convalescent patients

For NCP, the negative of nucleic acid detection is the key indicator of cure. But fatigue, cough, poor mental state and other symptoms are still present^[17]. Especially, the changes of patients' lung function and clinical symptoms are not symmetrical and synchronized. In fact, the negative patients are not healthy person, since they have no infectivity but need further recover. Usually, convalescent patients with NCP also have inflammation to be absorbed only after the nucleic acid detection turning negative. In the recovery, continued TCM treatments will reinforce the healthy qi and elim-

inate the pathogenic factors. Obviously, TCM improves the patient's symptoms and promotes the complete repair of damaged organs and tissues. Therefore, convalescent patients often continue to take TCM after the nucleic acid detection turning negative.

Conclusion

The cure rate of NCP is increasing from 2% in the early days to over 20% in these days. And in partial provinces, the cure rate has exceeded 40%^[18]. The application of TCM timely and widely is one of these positive actions in the fight against this outbreak. In view of the excellent performance of TCM at present, increasing number of patients are being treated with TCM additionally. As reported^[19], about 88% patients with NCP have been receiving the treatment integrated with TCM. Firstly, TCM has accumulated a wealth of experience of prevention and treatment of emerging infectious diseases in ancient time and recent decades. Then TCM still will adjust the specific medicine for each patient after diagnosing the syndrome, providing the more effective and personalized treatment. In addition, TCM will reduce adverse reactions of western medicine (such as antiviral, antibacterial drugs and hormones.) via avoiding or decreasing the use of these drugs in clinic. Therefore, TCM has special advantage in the combat with NCP.

However, there are several deficiencies in the development of TCM. As shown in Fig. 1, the national medical team of TCM dispatched to Wuhan timely, but they began to take over the inpatient ward several days later. Because there are no TCM related departments or sufficient Chinese medicine in infectious hospital and western medicine hospital. Obviously, the participation rate of TCM in these hospitals is very low. Secondly, the total number of medical staff of TCM is seriously inadequate in China. Such as this rescue, the medical staff of TCM accounted for less than 20% in the whole dispatched medical staffs from state and province. Moreover, the effect of TCM is not accepted constantly, owing to lack of modern scientific support. Nevertheless, there dozens of TCM for NCP are conducting clinical trials at present, certain specific Chinese medicines are also incorporated (Table. 2). As reported^[20-22], several Chinese medicines

Table 2 The representative clinical trials of TCM for NCP

No	Registration number	Scientific title	Date of Registration
1	ChiCTR2000029637	An observational study for Xin-Guan-1 formula in the treatment of 2019-nCoV pneumonia (novel coronavirus pneumonia, NCP)	2020-02-08
2	ChiCTR2000029628	Observational study of Xin-Guan-2 formula in the treatment of suspected 2019-nCoV pneumonia (novel coronavirus pneumonia, NCP)	2020-02-07
3	ChiCTR2000029605	A randomized, open-label, blank-controlled, multicenter trial for Shuang-Huang-Lian oral solution in the treatment of 2019-nCoV pneumonia (novel coronavirus pneumonia, NCP)	2020-02-07
4	ChiCTR2000029589	An open, prospective, multicenter clinical study for the efficacy and safety of Reduning injection in the treatment of 2019-nCoV pneumonia (novel coronavirus pneumonia, NCP)	2020-02-05
5	ChiCTR2000029487	Clinical Study for Gu-Biao Jie-Du-Ling in Preventing of 2019-nCoV Pneumonia (Novel Coronavirus Pneumonia, NCP) in Children	2020-02-02
6	ChiCTR2000029434	A randomized, open-label, blank controlled trial for Lian-Hua Qing-Wen Capsule/Granule in the treatment of 2019-nCoV pneumonia (novel coronavirus pneumonia, NCP)	2020-02-01
7	ChiCTR2000029432	A Real World Study For the Efficacy and Safety of Large Dose Tanreqing Injection in the Treatment of Patients with 2019nCoV Pneumonia (Novel Coronavirus Pneumonia, NCP)	2020-02-01

have exhibited favourable effect. In a word, the development of TCM still has long way to go.

On all accounts, TCM has accumulated a solid theoretical foundation of plague. In the fight against infectious diseases broke in recent decades, TCM has played an important role in the prevention and treatment. At present, TCM also has been effectively salvaging the patient with NCP. Therefore, TCM is and will be an effective treatment for NCP.

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