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i An update to this article is included at the end

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Letter to the Editor

Traditional Chinese medicine for COVID-19 treatment

1. Summary

The current 2019-nCoV outbreak is moving rapidly [1], the cumulative number of confirmed cases in mainland China has reached 80151, with 47,204 (58.89 %) cured cases and 2943 (3.67 %) deaths as of 2-Mar-2020, and no specific drug has been discovered for Coronavirus Disease 2019 (COVID-19). However, a number of clinical practice results showed that traditional Chinese medicine (TCM) plays significant role in the treatment of COVID-19, bringing new hope for the prevention and control of COVID-19.

TCM has a long history and played an indispensable role in the prevention and treatment of several epidemic diseases. During the SARS epidemic in 2003, the intervention of TCM has also achieved remarkable therapeutic effect. During the treatment period of COVID-19, more than 3100 medical staff of TCM were dispatched to Hubei province, and TCM scheme was included in the guideline on diagnosis and treatment of COVID-19 [2], and TCM experts fully participate in the whole rescue process. The decoction, Chinese patent medicine, acupuncture and other characteristic therapy of TCM was comprehensively employed, mainly treated based on syndrome differentiation. Specific TCM wards were set up, and established the designated hospital, moreover, TCM team participates in treatment collectively. Currently, the total number of confirmed cases treated by TCM has reached 60,107 [3]. In 102 cases of mild symptoms treated with TCM, the clinical symptom disappearance time was shortened by 2 days, the recovery time of body temperature was shortened by 1.7 days, the average length of stay in hospital was shortened by 2.2 days, the improvement rate of CT image was increased by 22 %, the clinical cure rate was increased by 33 %, 27.4 % reduction in the rate of common to severe cases and 70 % increase in lymphocyte.[3] In addition, in the treatment of severe patients with TCM, the average length of stay in hospital and the time of nucleic acid turning negative has been shortened by more than 2 days.

From current treatment results, TCM based on an over-all symptoms of 2019-nCoV pneumonia patients, has suggested to prescribe prescription that are likely to be effective, such as *qingfei paidu* decoction (QPD), *gancaoganjiang* decoction, *sheganmahuang* decoction, *qingfei touxie fuzheng recipe*, *etc*. QPD which consisted of *Ephedrae Herba, Glycyrrhizae Radix et Rhizoma Praeprata cum Melle, Armeniacae Semen Amarum, Gypsum Fibrosum, Cinnamomi Ramulus, Alismatis Rhizoma, Polyporus, Atractylodis Macrocephalae Rhizoma, Poria, Bupleuri Radix, Scutellariae Radix, Pinelliae Rhizoma Praepratum cum Zingibere et Alumine, Zingiberis Rhizoma Recens, Asteris Radix et Rhizoma, Farfarae Flos, Belamcandae Rhizoma, Asari Radix et Rhizoma, Dioscoreae Rhizoma, Aurantii Fructus Immaturus, Citri Reticulatae Pericarpium, and Pogostemonis Herba*, has been promoted as a general prescription in the diagnosis and treatment plan of COVID-19 in China [2]. Among the 701 confirmed cases treated by QPD, 130 cases were cured and discharged, clinical symptoms of 51 cases disappeared, 268 cases of symptoms improved, and 212 cases of stable symptoms without aggravation [3]. The effective cure rate of QPD against COVID-19 is over 90 %. According to the theory of TCM, the target organ location of COVID-19 is the lung, and the etiology attribute is “damp and toxin plague”. The network pharmacology analysis showed that QPD has an overall regulatory effect *via* multi-component and multi-target. The primary site of pharmacological action is the lung, as 16 herbs to lung meridian, which indicated that the decoction is mainly specific for lung diseases. In addition, it can play the role of dehumidification through the rise and fall of the spleen and stomach, and exhibited the protection for heart, kidney and other organs. Among the potential targets screen, most of them co-expressed with ACE-2, the receptor of COVID-19, indicating the potential improvement of COVID-19. It can inhibit the replication of COVID-19 by acting on multiple ribosomal proteins. COVID-19 can lead to strong immune response and inflammatory storm [4]. Functional enrichment analysis showed that QPD could inhibit and alleviate excessive immune response and eliminate inflammation by regulating immune related pathway and cytokine action related pathway [5]. Furthermore, through the prediction of molecular docking, it was found that patchouli alcohol, ergosterol and shionone in the formula had better anti – COVID-19 effect, which provided new molecule structures for new drug development [6].

Here, we take one highly suspected COVID-19 patient treated with TCM as a case example to show its effectiveness [7]. The male patient was on a business trip in *Wuhan* for several days before the onset of the disease. During the admission period, fever and cough were repeated, and respiratory rales of both lungs were not obvious. Western medicine was used firstly, including orally take oseltamivir phosphate capsule, intravenous infusion of ganciclovir, aerosol inhalation of recombinant human interferon a1b, *etc*. Although the nucleic acid test was negative, the results of chest CT showed that the fusion of two lung ground glass shadows was enlarged and the density was increased, which was more advanced than that of admission (Fig. 1a-1c). As the serious illness, combined with the patient's performance of damp-heat syndrome, and the heat is more serious than damp, QPD was added for treatment. On the night of administration, the body temperature dropped to 36.2 ℃, and then tended to be normal. After 6 days of treatment, chest CT was better than before, tracheobronchial shadow was normal, and inflammation was obviously absorbed (Fig. 1d). The patient had no fever or asthenia, coughing occasionally, and the rales of two lungs were weaker than before. After discharge, continue to take 7 doses of the prescription, occasionally cough, no special discomfort was found. The clinical symptoms and imaging examination of the patients improved significantly after the treatment, reflecting the advantages of TCM.

TCM has own characteristics such as holistic concept, balance of *Yin* and *Yang*, syndrome differentiation and treatment, strengthening the

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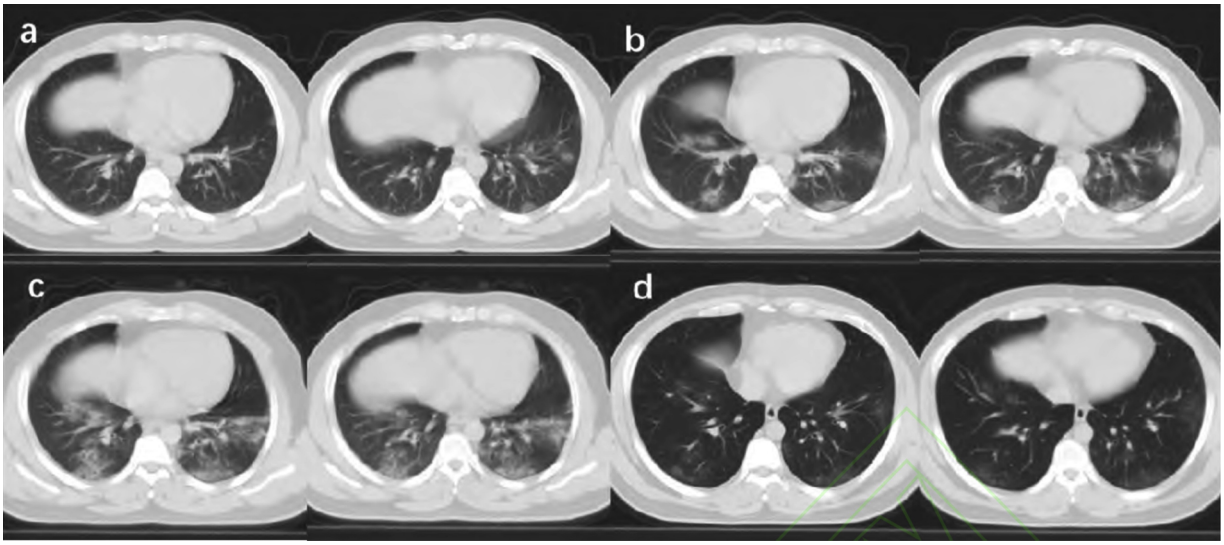

Fig. 1. Comparison of chest CT results of patients. (a), chest CT on January 24; (b), chest CT on January 28; (c), chest CT on January 30; (d), chest CT on February 4.

body resistance to eliminate pathogenic factors. TCM has thousands of years of experience in regulating the body and enhancing the resistance to epidemic diseases, with unique insights and prevention and control experience. For mild and common patients, the early intervention of TCM can effectively prevent the disease from transforming into severe and critical disease. In the severe cases, TCM has won time for rescuing them by improving symptoms (http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/42311/42560/index.htm). Treatment practice of COVID-19 showed that early intervention of TCM is important way to improve cure rate, shorten the course of disease, delay disease progression and reduce mortality rate. Furthermore, the reason why TCM works is not only to inhibit the virus, but might block the infection, regulate the immune response, cut off the inflammatory storm, and promote the repair of the body. Moreover, the prevention and control measures of COVID-19 fully reflect the ideology of "preventive treatment of disease". Apart from the epidemic diseases recorded in the Han Dynasty should be isolated, the preventive measures of TCM also include psychology, sports, diet, medication, *etc*.

In the next prevention and control work of COVID-19, it should give full play to the advantages of TCM in syndrome differentiation and the whole therapeutic effect, reduce the complications as well as death rate. Besides, the scientific research should also be carried out on the TCM with definite curative effective of COVID-19, to comprehensively evaluating its action mechanism and in-depth understanding COVID-19.

Declaration of Competing Interest

There are no conflicts to declare.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.phrs.2020.104743.

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Update

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Corrigendum

Corrigendum to "Traditional Chinese medicine for COVID-19 treatment" [Pharmacol. Res. 155 (2020) 104743]

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The authors have informed the Journal that in the letter to the Editor referenced above there were some imprecisions that need correction as follows: the sentence "As the serious illness, combined with the patient's performance of damp-heat syndrome, and the heat is more serious than damp, QPD was added for treatment' should have been 'As the serious illness, combined with the patient's performance of damp-heat syndrome, and the heat became more serious than damp, QJD (Qingjin Jianghuo Decoction) was added for treatment"

Legend to Fig 1 is modified as follows: Comparison of chest CT results of patients. (a), chest CT on January 24; (b), chest CT on January 28; (c), chest CT on January 30; (d), chest CT on February 4 (reproduced from Reference 7, with permission).

Acknowledgments are modified as follows:

We are grateful for Ms. Yinxing Zhu for providing the CT scans.

The authors apologise for any inconvenience these mistakes may have caused to the readers.

Editorial note:

The Editor has checked the originals of the CT scans and confirms that they are authentic. It was entirely transparent to the journal throughout the editorial process that the authors were not claiming any credit for the content from reference 7. The authors of the CT scans have confirmed their permission for re-publication.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.phrs.2020.104768.

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