

Case Report

Chinese Medicine Rescues Acute Respiratory Dyspnea Syndrome Caused by COVID-19: A Case Report*

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The novel coronavirus disease 2019 (COVID-19) pandemic has struck a devastating blow to our global health. With its over 100 million reported cases and 2 million death tolls across over 200 countries, every country is seeking effective methods of curing and preventing this disease. Prof. LI Guang-xi, with his over 20 years of clinical experience, recently proved that Renshen Baidu Powder (人参败毒散, RBP) plus transdermal therapy of Chinese medicine (CM) were very efficient to relieve the COVID-19 patients with fever, cough, and other symptoms, and rescue the patient from acute respiratory dyspnea syndrome (ARDS) state. This case report revealed a new approach in saving lives threatened by COVID-19.

Case Presentation

On Admission: January 22, 2020

A 54-year-old male patient reported to Wuhan Wuchang Hospital (China) with complaint of fever. Computerized tomography (CT) scan revealed "multiple small infiltrates in both lungs and interstitial changes in the lower regions of both lungs." It is consistent with the COVID-19 diagnostic imaging criteria,⁽¹⁾ which was later confirmed with the detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) nucleic acid in a clinical specimen.

Day 1–8: January 22–29, 2020

When the patient was admitted to the hospital, he was overweight according to his body mass index and had a history of diabetes, and was on metformin 500 mg twice a day. He was diagnosed with obstructive sleep apnea but not on a continuous positive airway pressure (CPAP) machine. The attending physician at the hospital originally proposed using moxifloxacin (Bayer Pharma AG, H20140424, Germany) and methylprednisolone (Pfizer Italia s.r.l, H20150245, Italy) intravenously for 8 days. At that time, the patient had a fever for 9 days, hovering around 38.5 °C. Nonsteroidal anti-inflammatory drugs

(NSAIDs) paracetamol sustained release tablets (Shanghai Johnson & Johnson Pharmaceuticals, Ltd., H31022766, China) were used temporarily to reduce his temperature, but the fever still returned.

Day 9: January 30, 2020

After a couple of days of conventional treatment, the patient's condition deteriorated, the family of the patient then consulted Dr. LI Guang-xi through Internet. The patient's body temperature reached 39.1 °C and his heart rate was 101 beats/min. At night, after going to the bathroom, his saturation of peripheral oxygen (SpO₂) desaturated to 58%, with severe breathing difficulty. The SpO₂ levels reached 87% (normal range ≥95%) when he was given oxygen through a nasal tube at 5 L/min, but he was still experiencing continuous coughing and shortness of breath (respiratory rate 32 beats/min). This patient was classified as a severe case according to the Guidelines for Diagnosis and Management of COVID-19 (8th ed) released by the National Health Commission of China.⁽²⁾ At night, he got up 4–5 times to go to the toilet, among which, he had a watery stool 1–2 times. Dr. Li diagnosed the patient with qi deficiency. He prescribed modified RBP and instructed the patient to take it 3–4 times per day (more frequently than the normal consumption at 2 times per day). The components of modified RBP were as follows: *Ginseng Radix et Rhizoma* 15 g, *Notopterygii Rhizoma et Radix* 12 g, *Angelicae Pubescentis Radix* 12 g, *Bupleuri Radix*

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15 g, *Peucedani Radix* 10 g, *Aurantii Fructus* 10 g, *Platycodonis Radix* 10 g, *Chuanxiong Rhizoma* 15 g, *Poria* 20 g, *Glycyrrhizae Radix et Rhizoma* 6 g, *Galli Gigerii Endothelium Coreneum* 20 g, *Sepiae Endoconcha* 20 g, *Menthae Haplocalycis Herba* 6 g, *Coptidis Rhizoma* 8 g, *Scutellariae Radix* 10 g, *Pinelliae Rhizoma* 9 g, and 3 pieces of *Zingiberis Rhizoma Recens* (Note that the pharmacy did not have *Ginseng* in stock and substituted *Ginseng leaves*).

After taking half a day's dosage, his temperature turned back to normal (37.1 °C). Under the same level of oxygen support, fingertip oxygen saturation (oximeter) reached 93% and his heart rate was 80 beats/min. Symptoms as diarrhea, nocturia, coughing, and shortness of breath were remitted after treatment.

Day 11: February 1, 2020

Two days after taking modified RBP, the patient developed a severe dry cough and hypoxemia after going to the bathroom and was immediately given treatment with the Transdermal Therapy System (TTS, APS401, Beijing Shenzhou Pharmaceutical Technology Co., Ltd., China, Figure 1). The device delivered medical drugs (Yiyongkesoutie, registered in U.S. Food & Drug Administration, National Drug Code: 77547) directly into the acupoints of Feishu (BL13) and Geshu (BL17) using its patented transdermal delivery methodology. After the first 20-min treatment, the patient's cough slackened. Then he continued to use TTS to suppress cough.



Figure 1. Patient Using Transdermal Therapy System

Day 19: February 9, 2020

The patient continued to take the herbal decoction and use TTS with an adjusted treatment plan according to his daily condition. He reported that shortness of breath and coughing had relived significantly. It showed that under the same levels of

oxygen support, his fingertip oxygen saturation went back to 99% comparing to 80% a week ago and his heart rate remained at 80 beats/min. The patient's condition continued to get better.

Day 28: February 18, 2020

The patient was released from oxygen support, and his fingertip oxygen saturation was at 95% on autonomous respiration. His fever had disappeared. Moreover, his cough and shortness of breath had relieved considerably. Labored respiration disappeared when the patient was in a calm condition. He discharged from the hospital despite a CT scan revealed that over 90% of his lung had "multiple sites of dense, patchy, strip-shaped and flake-shaped opacities and some fibrotic changes." The patient's remote pulmonary rehabilitation advisor recommended Baduanjin qigong, once a day, 12 min each time, to encourage the lungs to expel secretions (mucus and other material) and absorb infiltrates so that the lungs can regain full function. Changes in clinical symptoms before and after CM treatment can be found in Figure 2 and Appendix 1. Changes in the CT graph are shown in Figure 3. It should be noted that during the CM treatment, there were no adverse events or adverse drug reactions.

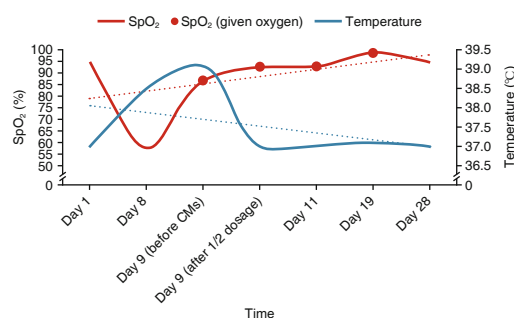


Figure 2. Temperature and SpO₂ Curve

Two weeks after discharge from the hospital, the patient was followed up by telephone interview and recovered as usual. He felt full of energy after exercising Baduanjin qigong.

Discussion

COVID-19 still expanded and has affected nearly every country worldwide. As of 11 April, 2021, more than 136 million cases have been confirmed, with more than 2.94 million deaths attributed to COVID-19, making it one of the deadliest pandemics in history.⁽³⁾

While the vast majority of patients remain

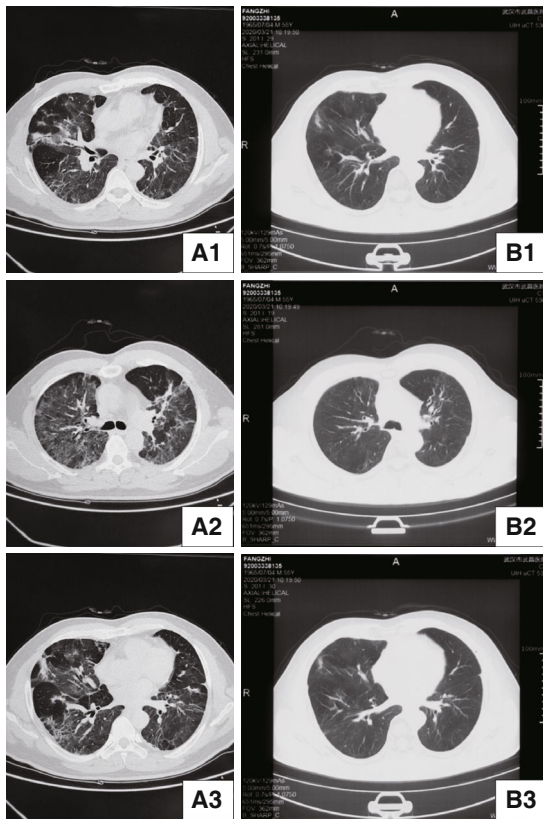


Figure 3. CT Pictures of Patient

Notes: A1–A3: CT pictures of the patient on February 19, 2020. B1–B3: CT pictures of the patient on March 21, 2020, after discharged. Compared with A1–A3, B1–B3 show diffuse distribution of wall less air sacs and striped shadows, without significant changes; the lower lobes of the two lungs and the right middle lobe show patchy shadows, which were significantly absorbed compared to the previous ones. CT: computed tomography

asymptomatic, the main clinical symptoms include fever, cough, and shortness of breath. A small proportion of patients with persistent fever will deteriorate and progress to ARDS one week after onset of disease,⁽⁴⁾ requiring ventilator-driven respiratory support. Although work is underway to develop vaccines and drugs that inhibit the virus, unfortunately, there is no specific, effective treatment or cure for COVID-19.⁽⁵⁾ Since mutations in the viral genome often result in drug resistance and immune evasion, creating a major hurdle for antiviral therapies and vaccine development. Supportive care such as NSAIDs to relieve symptoms (fever, body aches, cough) and intake of fluids may be inefficient in some severe cases. As for experimental treatments, such as hydroxychloroquine and lopinavir/ritonavir, later found to be ineffective or even harmful.⁽⁶⁾

For the reasons above, early identification of

those most vulnerable to severe COVID-19 is vital in reducing morbidity and mortality. In this case report, CM intervention at early stages is proved to effectively bring down a temperature without rebound, reduce alveolar exudation, suppress cough, promote alveolar repair, and thus come to a higher survival rate. External treatment using CM via percutaneous absorption has been demonstrated to reduce the first-pass effect of the drug and to take effect quickly. Therefore, CM could be a better option for protection and early intervention and play an important role in the turning point.

Dr. TONG Xiao-lin, the director of the CM national assistance team in Wuhan, the academican of the Chinese Academy of Sciences, indicated that the CM pathogenesis was epidemic in cold and dampness,⁽⁷⁾ that is why it broke out in Wuhan due to its humidity and coldness. A retrospective study of a familial cluster of COVID-19 in China showed that person-to-person transmission of this novel coronavirus between hospital and family members was rapid, with similar symptoms.⁽⁸⁾ Therefore, after identifying the disease mechanism, the physician only needs to modify the basic formulas slightly according to different symptoms of each family member, to prevent spreading within each family.

Meanwhile, factors predisposing to greater severity of COVID-19 include age and preexisting comorbidities such as diabetes, hypertension, respiratory and cardiovascular disease, and cancer. Another important risk factor is obesity,⁽⁹⁻¹¹⁾ which has been associated with more severe COVID-19 illness and death in several studies. According to CM, patients under these conditions are defined as qi deficiency, which means they are more vulnerable to develop acute lung injury, and thereafter get sick; when the pandemic influenza comes, they will be the first ones to catch the disease. According to this case, Chinese herbal medicine together with external treatment can help the high-risk population enhance their immune system to defeat the virus. Among them, it is worthwhile to mention that *Ginseng* has been proven as a natural effectual antiviral. In our above-stated case, we used RBP which contains a large amount of *Ginseng*, together with transdermal therapy to treat a critically ill patient, who was discharged and sent home to recuperate after 1 month of treatment.

Ginseng, one of the most popular herbal

remedies, is believed to restore and enhance wellbeing. It has been extensively reported to maintain homeostasis of the immune system and enhance resistance to illness or microbial attacks through regulation of the immune system, which is called "immune boost". Kim, et al⁽¹²⁾ showed in their *in vitro* experiment that red ginseng and vitamin C could enhance activation of immune cells like T and NK cells, repress progress of the viral lytic cycle, and also reduce lung inflammation caused by a viral infection. In another mouse research, Wang, et al⁽¹³⁾ found that intranasal co-inoculation of mice with fermented ginseng extract and influenza virus improved survival rates and conferred protection against H1N1, H3N2, H5N1, and H7N9 strains, and also developed immunity against the secondary infection with homologous and heterosubtypic viruses.

RBP had been stated as "the best formula for treating epidemic diseases", as it is suitable for treating many different types of epidemic (respiratory) diseases, especially for patients with qi deficiency. Prof. HUANG Huang also recommends Jingfang Baidu Powder (荆防败毒散), a modification of RBP, as a group preventive prescription in epidemic areas and progresses further clinical verification.⁽¹⁴⁾ RBP was originally recorded in the *Prescriptions of the Bureau of Taiping People's Welfare Pharmacy* (Tai Ping Hui Min He Ji Ju Fang). The prescription is composed of 10 herbs (*Notopterygii Rhizoma et Radix*, *Angelicae Pubescentis Radix*, *Bupleuri Radix*, *Peucedani Radix*, *Aurantii Fructus*, *Platycodonis Radix*, *Chuanxiong Rhizoma*, *Poria*, *Glycyrrhizae Radix et Rhizoma*, *Menthae Haplocalycis Herb*, *Zingiberis Rhizoma Recens*), which mainly treat the pandemic caused by cold and dampness pathogens. The formula Prof. Li used above was modified for that particular patient, so he recommends a general formula (if there is no pattern diagnosis): *Ginseng Radix et Rhizoma* 15 g, *Notopterygii Rhizoma et Radix* 12 g, *Angelicae Pubescentis Radix* 12 g, *Bupleuri Radix* 15 g, *Peucedani Radix* 10 g, *Aurantii Fructus* 10 g, *Platycodonis Radix* 10 g, *Chuanxiong Rhizoma* 15 g, *Poria* 20 g, *Glycyrrhizae Radix et Rhizoma* 6 g, *Galli Gigerii Endothelium Coreneum* 20 g, *Sepiae Endoconcha* 20 g, *Menthae Haplocalycis Herba* 6 g, and 3 pieces of *Zingiberis Rhizoma Recens*.

In addition to *Ginseng*, other herbs also play important roles in this formula. Recently, network

pharmacology of RBP in the treatment of COVID-19 showed that the total prescription had 209 components and 145 targets for COVID-19. It concluded that the treatment of COVID-19 with RBP is the result of multi-component, multi-target, and multi-channel interaction.⁽¹⁵⁾

Recently, a research team has studied moxibustion in the treatment of COVID-19 from the perspective of modern CM mechanisms. It is pointed out that such external CM treatment may prevent and treat COVID-19 by improving the body's immunity to conquer the virus, enhancing anti-inflammation to alleviate the inflammatory response from COVID-19, and improving lung function to inhibit pulmonary fibrosis.⁽¹⁶⁾ In this case report, the introduction of CM preparation with antitussive and phlegm-removing treatment through TTS that combines moxibustion, cupping, and medicine penetration functions, has proved that the external treatment of CM is effective.

The principle of TTS is to use a transdermal drug delivery device, directly pass the components of Chinese herbal medicines to the subcutaneous tissues on the healing areas. Compared with traditional plasters, it has three advantages. First, a fully sealed drug delivery device solves the problem of volatilization of the effective small molecule aromatic hydrocarbons in Chinese herbal medicines. Second, the temperature control system can reach to 70 ± 5 °C precisely and last for 1 h, which will achieve the continuous drug administration dynamics, without low temperature burn. Third, the negative pressure of the outer ring seal cavity and the positive pressure of the drug delivery area form a pressure difference. Meanwhile, TTS can hydrate the stratum corneum which increases its permeability and promotes the flow of subcutaneous tissue fluid. Thus, TTS establish an effective drug delivery channel, which makes all components of Chinese herbal medicines break through the stratum corneum smoothly and forms an effective drug molecule concentration in the administration area.

When the alveolar has the opportunity to rest, they can restore by themselves, which prevents the progressing of the lung injury. Therefore, the patient would stay at the pulmonary phase instead of being worse to the hyper inflammation phase. In this case, TTS may prevent further alveolar injured, and it makes alveolar cure itself by reducing the severity and frequency of the cough.

Conflict of Interest

Author Li GX is a member of the Editorial Board for *CJIM*. The paper was handled by the other Editor and has undergone rigorous peer review process. Author Li GX was not involved in the journal's review of, or decisions related to, this manuscript.

Author Contributions

Li GX and Bian YJ conceived and designed the study. Liu SX and Xia K collected clinical data and drafted the manuscript. Li GX reviewed and edited the final version for publication.

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REFERENCES

- Hani C, Trieu NH, Saab I, Dangeard S, Bennani S, Chassagnon G, et al. COVID-19 pneumonia: a review of typical CT findings and differential diagnosis. *Diagn Interv Imag* 2020;101:263-268.
- The National Health Commission of People's Republic of China. Interpretation of new coronavirus pneumonia diagnosis and treatment plan (trial version 8). Accessed August 19, 2020. Available at <http://www.nhc.gov.cn/zyzyj/s7653p/202008/0a7bdf12bd4b46e5bd28ca7f9a7f5e5a/files/a449a3e2e2c94d9a856d5faea2ff0f94.pdf>.
- COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU). Accessed April 13, 2021. Available at <https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/D.A>.
- Dunlop DD, Song J, Semanik PA, Sharma L, Bathon JM, Eaton CB, et al. Relation of physical activity time to incident disability in community dwelling adults with or at risk of knee arthritis: prospective cohort study. *BMJ* 2014;348:g2472.
- Siemieniuk RA, Bartoszko JJ, Ge L, Zeraatkar D, Izcovich A, Kum E, et al. Drug treatments for COVID-19: living systematic review and network meta-analysis. *BMJ* 2020;370:m2980.
- Kim PS, Read SW, Fauci AS. Therapy for early COVID-19: a critical need. *JAMA* 2020;324:2149-2150.
- Tong XL, Li XY, Zhao LH, Li QW, Yang YY, Lin ZQ, et al. Discussing the prevention and treatment strategy of new coronavirus pneumonia with traditional Chinese medicine from the perspective of "cold and dampness". *J Tradit Chin Med (Chin)* 2020;66:465-470,553.
- Bi Q, Wu Y, Mei S, Ye C, Zou X, Zhang Z, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: a retrospective cohort study. *Lancet Infect Dis* 2020;20:911-919.
- Kulkarni K, Karssiens T, Kumar V, Pandit H. Obesity and osteoarthritis. *Maturitas* 2016;89:22-28.
- Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014;384:766-781.
- NCD Risk Factor Collaboration (NCD-RisC). Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet* 2016;387:1377-1396.
- Kim H, Jang M, Kim Y, Choi J, Jeon J, Kim J, et al. Red ginseng and vitamin C increase immune cell activity and decrease lung inflammation induced by influenza A virus/H1N1 infection. *J Pharm Pharmacol* 2016;68:406-420.
- Wang Y, Jung YJ, Kim KH, Kwon Y, Kim YJ, Zhang Z, et al. Antiviral activity of fermented ginseng extracts against a broad range of influenza viruses. *Viruses* 2018;10:471.
- Huang H. Thinking of new coronavirus pneumonia based on classic Chinese medicine. *J Nanjing Univ Tradit Chin Med (Chin)* 2020;63:152-156.
- Liu Y, Liu JB, Peng W. Discussion on network pharmacology of the mechanism of action of Renshen Baidu Powder in the treatment of novel coronavirus pneumonia. *J Chin Med Mater (Chin)* 2020;6:1536-1544.
- Xu J, Pan LJ, Jia CS. Exploration on the feasibility of moxibustion in prevention and treatment of COVID-19 from the perspective of modern medical mechanism. *World J Acupunct Moxibust (Chin)* 2020;30:81-84.

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