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CLINICAL RESEARCH

To observe the curative effect of Qing Hua Cheng Qi decoction combined with Western medicine in the treatment of acute exacerbation of chronic obstructive pulmonary disease (AECOPD) and effects on pulmonary functions

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Keywords

Qing Hua Cheng Qi Decoction, AECOPD, Inflammation, Pulmonary function

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Abstract

Objective To investigate the curative effect of Qinghuachengqi decoction combined with Western medicine in the treatment of acute exacerbation of chronic obstructive pulmonary disease and effects on pulmonary function. **Methods:** A total of 86 patients with AECOPD were divided into the observation group and the control group.The control group was treated with routine Western medicine and symptomatic treatment,while the observation group was treated with Qinghuachengqi decoction on the basis of the control group.The levels of main inflammatory markers were detected before and after treatment. The changes of lung functions were measured before and after treatment in two groups.**Results:** The curative effect of the study group was obviously better than that of the control group,with a statistically significant difference.The levels of hs-CRP, IL-17,IL-8 and PCT in the two groups were greatly lower than those before treatment. After treatment, the levels of hs-CRP, IL-17, IL-8 and PCT in the study group were greatly lower than those in the control group, with a statistically significant difference.The levels of FEV1/FVC, PEF and FEV1%pred in the two groups were noticeably higher than those before treatment. After treatment, the levels of FEV1/FVC, PEF and FEV1%pred in the study group were higher than those in the control group,with a statistically significant difference.**Conclusion:** Qinghuachengqi Decoction combined with Western medicine can significantly reduce inflammation in patients with AECOPD and improve their lung functions.

Introduction

The current treatment of AECOPD in Western medicine is mainly symptomatic treatment, but there is still much room for improvement, the long-term use of antibiotics can cause drug resistance in bacteria, moreover, the use of glucocorticoids has certain

adverse effects on the human body, etc. [1]. With the in-depth research of TCM in COPD, the effects of traditional Chinese medicine in diagnosis and treatment have gradually been recognized by many physicians [2]. To improve the clinical therapeutic effect, this study adopts the Qing Hua Cheng Qi formula to treat 43 cases of AECOPD patients on the basis of the conventional treatment of Western medicine, and achieved strong therapeutic effect.

General Information

Eighty-six patients with AECOPD admitted to our hospital from February 2019 to March 2020 were selected and divided into a study group and a control group according to the random number table method, with 43 patients in each group. There were 27 males and 16 females in the study group, aged 42-72 years old, with an average (57.08±6.17) years old, course of COPD of 4-17 years (average (11.27±3.14) years), course of acute episodes 1-5day(s, average (2.31±0.51) day), body mass index (21.35±2.91) kg/m^2. 22 cases showed positive bacterial culture. According to the random number table, the Gold classification divided 19 cases into grade 2 and 24 cases into grade 3. In the control group, there were 25 males and 18 females, aged 43-71 years, mean (56.96±6.20) years, COPD duration 4-16 years, mean (11.19±3.20) years, acute attack duration 1-5d, mean (2.27±0.60) d, body mass index (21.28±2.87) kg/m2, among which 20 cases with positive bacterial culture, according to the following criteria The Gold grade could be divided into 21 patients with grade 2 and 22 patients with grade 3. The two groups were comparable in terms of male-to-female ratio, age, COPD duration, attack duration, body mass index, bacterial positivity, and Gold grade, with no statistically significant differences (P>0.05).

Diagnostic Criteria

COPD meets the relevant criteria in the Guidelines for the Diagnosis and Treatment of Chronic Obstructive Pulmonary Disease [3]. Its main symptoms include dyspnea, cough and sputum; FEV1/FVC <70% in pulmonary function tests; persistent airflow limitation. Reduced lung functions or similar symptoms caused by other factors have been excluded.

AECOPD refers to the short-term worsening of respiratory symptoms such as cough, wheezing and coughing up sputum in COPD patients, which exceeds the daily variation and may be accompanied by fever, thereby requiring a change in the clinical treatment plan.

The primary symptoms include wheezing and shortness of breath, cough, sputum, or phlegm, and unfavorable gurgling and vomiting. Secondary symptoms include vomiting, chest tightness, mucus in the mouth without thirsty, and dullness; the tongue is pale and thick, and microphygmia.

Inclusion and exclusion criteria

Inclusion criteria: (1) Western and Chinese medical diagnostic criteria for AECOPD were met; (2) disease course was ≤5 days; (3) all patients voluntarily participated in the study and signed an informed consent form.

Exclusion criteria: (1) history of antibiotics or other related treatments in the last month before study; (2) patients with lung tumors, tuberculosis, asthma, or tubercle lesions; (3) patients with severe dysfunction of the heart, liver, kidney, blood system, and nervous system; (4) patients with impaired consciousness, poor compliance, or inability to complete the entire course of treatment; (5) patients requiring non-invasive or invasive mechanical ventilation; (6) patients with allergy to the study drugs.

Treatment methods

In control group, symptomatic treatment with conventional Western medicine was applied, including oxygen support, antibacterial treatment with cefoperazone sodium and sulbactam sodium, and nebulization with salbutamol and budesonide.

In observation group, based on the control group, the treatment was based on a Qing Hua Cheng Qi prescription consisting of 15g of gypsum, 15g of mulberry bark, 15g of motherwort, 15g of piper betel, 12g of scutellaria, 12g of rhubarb, 9g of almond, 9g of Platycodon grandiflorum, 9g of Fahansia, 9g of Poria,

12g of gardenia, 6g of licorice. The decoction was taken warmly at 1 dose daily for 450ml of juice, three times a day in the morning, midday and evening for 9 days.

Treatment effectiveness

Traditional Chinese Medicine Syndrome Score Scale (TCMSSS) [4] was applied to evaluate the treatment effectiveness, according to cough, sputum volume, sputum quality, wheezing, fever, and dry stool [5]. The scale was divided into four levels asno, mild, moderate, and severe, and scored as 0, 1, 2, and 3, respectively. The sum of each symptom score was the final TCMSS. According to the nimodipine method, the effectiveness index = (pre-treatment TCM symptom score - post-treatment TCM symptom score) / pre-treatment TCM symptom score × 100%. To the therapeutic efficacy criteria were specifically as follows: (1) clinical cured: the main clinical symptoms and signs disappeared, all examination results returned to normal, and the therapeutic efficacy index was >95%; (2) significant effective, the main clinical symptoms and signs improved significantly, and the therapeutic efficacy index was 70%-95%; (3) effective, the main clinical symptoms and signs improved, and the therapeutic efficacy index was ≥30%, but <70%; (4) ineffective, the above criteria were not met, and the therapeutic efficacy index was <30%.

Observation indicators.

Before and after treatment, 3 ml of fasting venous blood was collected from patients, and serum levels of hs-CRP, IL-17, IL-8, PCT and ESR were measured by chemical immunoassay. Changes in lung function, including FEV1/FVC, PEF, FEV1%pred, were measured by a lung function monitor (MAS-99).

Statistical analysis

SPSS19.0 was used for the analysis, rank sum test was used for the comparison of grade data, $\chi 2$ test was used for the comparison between groups for counting data, and the measurement data was shown as $\bar{x}\pm s$. Independent samples t-test was used for the comparison between the two groups for normal distribution, paired t-test was used for the comparison within groups. $P<0.05$ was used to indicate statistically significant differences.

Results

Comparison of the treatment effectiveness of the two groups

The treatment effectiveness of the study group was significantly better than that of the control group, and the difference was statistically significant ($P<0.05$). See Table 1.

Table 1 Comparison of the treatment effectiveness of the two groups

Groups	Cases	Clinically cured	Significantly effective	Effective	Ineffective
Observation group	43	20	15	6	2
Control group	43	10	13	12	8

Note: Inter-group comparison, $Z=2.939$, $p<0.05$.

Comparison of cytokines between two groups before and after treatment

The hs-CRP, IL-17, IL-8, and PCT of the two groups before treatment were not statistically significant ($P>0.05$), but the 4 cytokines of the two groups after treatment were significantly lower than those before treatment ($P<0.05$). After treatment, hs-CRP, IL-17, IL-8, and PCT of the study group were significantly lower than those of the control group, with a statistically significant difference ($p<0.05$). See Table 2.

Comparison of lung function between the two groups before and after treatment.

The FEV1/FVC, PEF, FEV1%pred of the two groups before treatment were not statistically significant (P>0.05), but were all significantly higher than before treatment (P<0.05). After treatment, the FEV1/FVC, PEF, FEV1%pred of the observation group was higher than that of the control group, and the difference was statistically significant (p<0.05). See Table 3.

Table 2 comparison of hs-CRP, IL-17, IL-8, and PCT between the two groups

Groups	Time	Cases	hs-CRP(mg/l)	IL-17(pg/ml)	IL-8(pg/ml)	PCT(ug/l)
Observation group	Before treatment	43	15.32±2.75	38.19±4.26	15.68±4.15	1.43±0.39
	After treatment	43	6.40±1.38[ab]	16.94±3.05[ab]	8.31±2.20[ab]	0.72±0.21[ab]
Control group	Before treatment	43	15.28±2.81	37.98±4.32	15.59±4.08	1.38±0.41
	After treatment	43	8.95±1.62[a]	20.63±3.49[a]	11.24±2.76[a]	1.16±0.35[a]

Note: intra-group comparison, [a]P<0.05; inter-group comparison, [b]P<0.05.

Table 3 Comparison of FEV1/FVC、PEF、FEV1%pred between the two groups before and after treatment

Groups	Time	Cases	FEV1/FVC (%)	PEF(L/min)	FEV1%pred
Observation group	Before treatment	43	54.76±5.62	4.50±1.12	61.65±12.47
	After treatment	43	87.03±6.95[ab]	7.39±1.35[ab]	80.74±13.08[ab]
Control group	Before treatment	43	55.01±5.72	4.56±1.17	62.02±12.63
	After treatment	43	81.42±6.19[a]	6.48±1.29[a]	71.97±12.84[a]

Note: intra-group comparison, [a]P<0.05; inter-group comparison, [b]P<0.05.

Discussion

In Chinese medicine, COPD is clinically considered to be a "lung distension" and "cough", a chronic deficiency of lung Qi and yin, weakened defensive Qi, external heat dampness and dryness of the fire and six exogenous factors that cause diseases. AECOPD is usually associated with phlegm and heat stagnation in the lungs, and the principle of TCM treatment is to promote the lung functions, relieve asthma, resolve phlegm and stop coughing, and promote internal organs [5]. In this study, in the formula Qing Hua Cheng Qi, Zhi Mu and gypsum was used, which focused on clearing heat and nourishing Yin; rhubarb can clear heat and help pass stool; piper betel can moisten the intestines, help pass stool, and regulate Qi; almond can relieve cough and asthma; Scutellaria baicalensis and gardenia can clear heat and remove dampness; Ban Xia can remove dampness and resolve phlegm, and is often used for treating cough together with phlegm; mulberry bark can clear away lung heat and reduce swelling; Platycodon grandiflorus can enhance lung Qi, expectorate and reduce swelling; Poria can clear and remove dampness, thereby strengthening the spleen and promoting Qi [6].

The inflammatory response of AECOPD is closely related to the development and progression of a disease. hs-CRP is an acute phase response protein secreted by hepatocytes, which is closely related to the degree of inflammation. hs-CRP can increase the phagocytosis of neutrophils, activate complement, and

promote the anti-inflammatory response of the body. IL-17 is a cytokine secreted by Th17 cells, which has strong pro-inflammatory effects and can promote the recruitment of macrophages, neutrophils, toxic T cells and other inflammatory cells to the site of inflammation, thus exacerbating the inflammatory response; IL-17 can also promote the function of epithelial cells in the trachea [7]. Hyperactivity, which promotes the release of cytokines such as MMP-9 and TGF-β1, will lead to structural destruction of lung tissues [8]. IL-7 is also directly involved in inducing the release of IL-8, a cytokine secreted mainly by neutrophils, which has a strong chemotactic effect and can promote the accumulation of a large number of inflammatory cells in the epithelial and endothelial tissues of the lung, thereby releasing large amounts of arachidonic acid and oxygen free radical to aggravate cell damage in lung tissues, promote the abnormal proliferation of epithelial cells in the airways and airway overdilation. The level of PCT is positively correlated with the degree of inflammatory response [10]. The results of this study showed that the levels of hs-CRP, IL-17, IL-8, and PCT were significantly reduced in both groups after treatment, and the degree of reduction in the study group was noticeably better than that in the control group. Moreover, the Qing Hua Cheng Qi formula could effectively reduce the inflammatory response in AECOPD patients. Modern pharmacological studies have shown that Zhimu can inhibit the growth of various pathogenic microorganisms such as Staphylococcus pneumoniae and Staphylococcus aureus. Piper betel has antitumor, antibacterial, anti-inflammatory, immunity promotion and other effects; Scutellaria baicalensis has significant anti-inflammatory, antibacterial, antipyretic, sedative effects; almonds have flavonoids with anti-inflammatory, antibacterial, antiviral, anti-allergic properties; Platycodon can also enhance the phagocytosis of macrophages, improve the capillary permeability, regulate NO release, and inhibition of mast cell and leukocyte-mediated inflammation; Poria cocos can regulate humoral immune function and reduce inflammation [11].

Pulmonary function tests are often used to assist in the diagnosis of COPD. The examination of lung function changes is of clinical significance for understanding the disease progression, treatment transfer and prognosis of AECOPD patients [16]. The results of the present study showed that the pulmonary function indexes of both groups improved significantly after treatment, and the degree of improvement in the study group was significantly better than that in the control group. The results suggest that Qing Hua Cheng Qi Fang can effectively improve lung function and reduce clinical symptoms in AECOPD patients. The possible mechanism is related to the ability of the qi-clearing formula to reduce inflammation.

In conclusion, the combination of Qing Hua Chengqi Fang and Western medicine can significantly reduce the inflammatory response and improve lung function in AECOPD patients.

Declaration of conflict-of-interest

The authors declare no conflict-of-interest.

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