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Effect of Feikangning composition in improving the pulmonary function in patients with COPD merged with pulmonary arterial hypertension

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ABSTRACT

Objective: To explore the effect of Feikangning composition in improving the pulmonary function in patients with COPD merged with pulmonary arterial hypertension (PAH), and observe the changes of ET-1 and D-D levels before and after treatment. **Methods:** A total of 52 patients with COPD merged with PAH who were admitted in our hospital were included in the study and randomized into the treatment group (n=31) and the control group (n=21). The patients in the two groups were given routine treatments after admission. On this basis, the patients in the treatment group were given Feikangning composition. ET-1 and D-D levels before treatment and 1 month after treatment in the two groups were detected. FEV1, FVC, FEV1%, mPAP, TPR, and $SteO_2$ before and after treatment in the two groups were compared. **Results:** FEV1, FVC, and FEV1% after treatment in the treatment group were significantly higher than those in the control group. PAP and $SteO_2$ after treatment in the treatment group were significantly higher than those in the control group, while TPR was significantly lower than that in the control group. ET-1 and D-D levels after treatment in the treatment group were significantly lower than those in the control group. **Conclusions:** Feikangning composition can effectively improve the ventilation function in patients with COPD merged with PAH, and regulate the endothelin balance, with a significant efficacy.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common pulmonary disease characterized by progressive airway limitation, and incompletely reversible airway limitation in the clinic[1]. With the alteration of modern society environment and climate, the occurrence rate of COPD is gradually increasing[2,3]. COPD can cause ventilation and alveolar ventilation disorders to promote short of breath, hypoxemia, and respiratory acidosis, finally leading to pulmonary arterial hypertension (PAH)[4]. PAH generally occurs after hypoxemia. Once the patients are merged with PAH, the risk of secondary pulmonary heart disease is significantly elevated[5]. Due to repeated attack, complicated pathogenesis, and being affected by various factors, the treatment for COPD is intractable, and symptomatic treatment is generally adopted in the clinic to improve the clinical symptoms, but the efficacy is poor[6]. The study is aimed to explore the effect of Feikangning composition in improving the pulmonary function in patients with COPD merged with PAH.

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2. Materials and methods

2.1. Clinical materials

A total of 52 patients with COPD merged with PAH who were admitted in our hospital from August, 2013 to October, 2015 were included in the study. All the patients were in accordance with the diagnostic criteria of COPD[7], in the acute attack period, with average pulmonary arterial pressure >20 mmHg. The patients were randomized into the treatment group (n=31) and the control group (n=21). In the treatment group, 18 were male, and 13 were female; aged from 50 to 75 years old; course from 5 to 11 years, with an average course of (8±1) years. In the control group, 12 were male,

and 9 were female; aged from 51 to 73 years old; course from 5 to 11 years, with an average course of (9±1) years. The comparison of age and course between the two groups was comparable (P>0.05). Exclusion criteria: (1) those who had mental disorders, severe liver and renal dysfunction, and pulmonary disease; (2) those who were great than 75 years old or less than 45 years old; (3) those who had allergic constitutions.

2.2. Treatment methods

The patients in the two groups were given sputum dilution, theophylline, antibiotics, and symptomatic treatments. Methods: routine oxygen therapy, low flow oxygen inhalation, oxygen inhalation time 20 h every d; 0.25 theophylline + 5% glucose (250 mL), ivdrip, 1 time/d; 0.9% normal saline (2 mL) + salbutamol (1 mL) + ipratropium bromide (2 mL), aerosol inhalation; levofloxacin (0.3 g), PO, 1 time/d; continuously for 2 weeks. On this basis, the patients in the treatment group were given Feikangning composition (100 mL), 2 times/d.

2.3. Observation indicators

ET-1 and D-D levels before treatment and 1 month after treatment in the two groups were detected. FEV1, FVC, FEV1%, mPAP, TPR, and $SteO_2$ before and after treatment in the two groups were compared.

2.4. Statistical analysis

SPSS 16.0 software was used for the statistical analysis. T test was used for the measurement data. P<0.05 was regarded as statistically significant.

3. Results

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

The comparison of FEV1, FVC, and FEV1% before treatment between the two groups was not statistically significant (P>0.05). FEV1, FVC, and FEV1% after treatment were significantly elevated when compared with before treatment (P<0.05). FEV1, FVC, and FEV1% after treatment in the treatment group were significantly higher than those in the control group (P<0.05) (Table 1).

3.2. Comparison of mPAP, TPR, and SteO2 before and after treatment between the two groups

The comparison of mPAP, TPR, and $SteO_2$ before treatment between the two groups was not statistically significant (P>0.05). PAP and $SteO_2$ after treatment were significantly elevated, while TPR was significantly reduced when compared with before treatment (P<0.05). PAP and $SteO_2$ after treatment in the treatment group were significantly higher than those in the control group (P<0.05), while TPR was significantly lower than that in the control group (P<0.05) (Table 2).

3.3. Comparison of ET-1 and D-D levels before and after treatment between the two groups

Table 1.
Comparison of the pulmonary function before and after treatment between the two groups.

Groups	n		FEV1	FVC	FEV1%
Treatment	31	Before treatment	1.06±0.36	2.23±0.83	39.62±0.41
		After treatment	1.20±0.48*#	2.52±0.91*#	48.33±0.45*#
Control	21	Before treatment	1.04±0.34	2.19±0.84	41.30±0.39
		After treatment	1.13±0.36*	2.33±0.83*	45.04±0.43*

*P<0.05, when compared with before treatment; #P<0.05, when compared with the control group.

Table 2
Comparison of mPAP, TPR, and $SteO_2$ before and after treatment between the two groups.

Groups	n		mPAP	TPR	SteO2
Treatment	31	Before treatment	30.32±9.72	9.26±3.00	90.98±3.21
		After treatment	21.69±6.74*#	6.01±1.87*#	96.01±3.44*#
Control	21	Before treatment	30.29±9.81	9.34±2.28	91.29±2.92
		After treatment	18.21±4.18*	7.98±1.14*	93.11±2.21*

*P<0.05, when compared with before treatment; #P<0.05, when compared with the control group.

Table 3
Comparison of ET-1 and D-D levels before and after treatment between the two groups.

Groups	n		ET-1 (pg/mL)	D-D (mg/L)
Treatment	31	Before treatment	102.11±36.29	2.41±1.01
		After treatment	73.26±16.89*#	1.52±0.58*#
Control	21	Before treatment	101.97±36.38	2.36±0.96
		After treatment	86.74±22.51*	1.98±0.67*

*P<0.05, when compared with before treatment; #P<0.05, when compared with the control group.

The comparison of ET-1 and D-D levels before treatment between the two groups was not statistically significant (P>0.05). ET-1 and D-D levels after treatment were significantly reduced when compared with before treatment (P<0.05). ET-1 and D-D levels after treatment in the treatment group were significantly lower than those in the control group (P<0.05) (Table 3).

4. Discussion

Due to the deferment of COPD, the patients are usually merged with PAH, even inducing pulmonary heart disease to threaten their lives[8]. The increased mucus secretion, and chronic cough and expectoration due to cilia dysfunction are involved in the early clinical manifestations of COPD, with pathological changes of small airway inflammation and fibrosis, which can severely affect the patients' pulmonary ventilation function[8]. Some researches demonstrate that[9-11] the excessive inflation can occur in the early stage of COPD, and is a main reason for causing short of breath after activity. With the disease progression, due to the aggravation of airway obstruction and destruction of pulmonary parenchyma and pulmonary vascular bed, the pulmonary ventilation and gas exchange are further reduced, resulting in hypoxemia and hypercapnia, while long-term chronic hypoxia can cause extensive pulmonary vascular contraction, PAH, and pulmonary endometrial hyperplasia to induce fibrosis and occlusion, resulting in pulmonary circulation remodeling.

COPD belongs to the scope of lung distention, gasp syndrome, and cough by the traditional Chinese medicine, and bowel-relaxing, and qi tonifying and blood activating are mainly involved in the treatment; but for the patients at the acute attack stage, lung clearing and phlegm eliminating are generally adopted[12]. Feikangning composition is mainly composed of white mulberry root-bark, Eupatorium japonicum, thunberg fritillary bulb, pepperweed seed, rhizoma pinelliae preparatum, salvia miltiorrhiza, snakegourd fruit, and curcuma aromatica, and has efficacies of blood activating, urination promoting, lung clearing and phlegm eliminating. The results in the study showed that FEV1, FVC, and FEV1% after treatment in the treatment group were significantly higher than those in the control group (P<0.05); PAP and $SteO_2$ after treatment in the treatment group were significantly higher than those in the control group (P<0.05), while TPR was significantly lower than that in the control group (P<0.05), indicating that routine treatments in combined with Feikangning composition can effectively improve the pulmonary ventilation function in patients with COPD merged with PAH. D-D can effectively reflect the blood hypercoagulation, while ET-1 has a certain contraction effect on the airway and pulmonary vessels[12,13]. When the patients are in a hypoxemia state, ET-1 synthesis will be increased, and ET-1 will combine with the receptors to produce a series of reactions to aggravate PAH[14]. The results in the study showed that ET-1 and D-D levels after treatment in the treatment group were significantly lower than those in the control group (P<0.05), indicating that Feikangning composition can regulate the endothelin balance in patients with COPD merged with PAH, and alleviate the contraction effect of endothelin on the pulmonary vessels in order to reduce the pulmonary arterial pressure[15,16].

In conclusion, Feikangning composition can effectively improve the ventilation function in patients with COPD merged with PAH, and regulate the endothelin balance, with a significant efficacy.

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