Efficacy of the Medication in Combination with Rehabilitation on Chronic Obstructive Pulmonary Disease

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To analyze the efficacy of medication in combination with rehabilitation on chronic obstructive pulmonary disease is the objective of the study. Between January 2017 and June 2018, a total of 160 chronic obstructive pulmonary disease patients treated in this hospital were enrolled as the subjects and randomized into two groups, with 80 subjects in each group, for regular medication. Subjects in the observation group additionally took rehabilitation. 3 mo later, we compared the pulmonary function, blood-gas indicators, scores of the relevant symptoms and the frequency of acute onset. Following treatment, pulmonary function and blood-gas indicators were somehow ameliorated in patients of two groups with improvement in the performance of 6 min walking test and activity of daily living, a decrease in the modified Medical Research Council score. During the 1 y follow-up, patients in two groups had significant decreases in the frequency of acute onset and hospitalization (all $p<0.05$). Differences of the indicators between two groups showed statistical significance ($p<0.05$). On the basis of medication for chronic obstructive pulmonary disease, rehabilitation can efficiently improve the pulmonary function, blood-gas indicators and life quality of patients.

Key words: Chronic obstructive pulmonary disease, medication, rehabilitation, blood-gas indicators

Chronic Obstructive Pulmonary Disease (COPD), also known as the obstructive pulmonary emphysema, manifests the dilation of the distal end of terminal bronchioles, with damage to the bronchial wall. For COPD patients, relevant factors, such as smoking or air pollution, may further induce the chronic bronchiolitis, which threatens the physical and mental health of patients. No efficient treatment has been established against the COPD, but a clinical consensus has been developed that prophylaxis is effective in decreasing the onset and frequency of COPD and improve the exercise tolerance and life quality[1,2]. Generally, treatment of COPD mainly relies on the glucocorticoid, anti-inflammatory agent and antibiotics, but the clinical work emphasizes the medication, instead of the rehabilitation for COPD[3]. Recently, people have gradually noted the importance of rehabilitation in treatment of COPD. Thus, to further clarify the role of rehabilitation in treatment of COPD, we selected COPD patients as subjects to perform the randomized control study, so as to analyze the efficacy of medication in combination with rehabilitation on COPD. Between January 2017 and June 2018, a total of 160 COPD patients treated in this hospital were enrolled as the subjects and randomized into two groups, with 80 subjects in each group. Diagnosis of COPD was made as per the Guidelines for Diagnosis and Treatment of COPD[4]. Before treatment, no statistical significance was identified in the differences of sex ratio, age, Body Mass Index (BMI), disease course, White Blood Cell (WBC) and neutrophils in peripheral blood, heart rate, the percentage of Forced Expiratory Volume in 1 s in Predicted Value (FEV_1 % pre), FEV_1/Forced Vital Capacity (FVC) and smoking history between two groups ($p>0.05$), suggesting that the data of two groups were comparable (Table 1). This study had been approved by the Ethics Committee of Heze Domestic Professional College. Inclusion criteria include patients aged between 40 y and 70 y; patients in stable disease; patients with no allergy to the test drugs; patients comprehending the meaning and use of scales used in this study correctly; patients who signed the written informed consents. Exclusion criteria include patients who had the history of therapeutic regimen in this study

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within 1 y prior to this study; patients with acute onset within 1 mo before treatment; patients with tuberculosis, lung cancer or other pulmonary diseases; patients failing to obey the medical advice; patients with bad habits; patients with out-of-control hypertension; patients with dysfunction or tumors in heart, liver or kidney. Treatment used in this study is as follow. Control group was treated with seretide (Glaxo Wellcome Production, 50 μg/250 μg, 60 packs), nasal inhalation, one pack every time, twice per day; theophylline sustained release tablets (Guangzhou Maite Xinghua Pharmaceutical Factory Co., Ltd, 0.1 g, 24 tablets), oral administration, 0.1 g/time, twice per day for 3 mo. In addition to the medication same as the control group, rehabilitation plan was stipulated for patients in the observation group. Abdominal breath training-Patients were required to keep in sitting posture, relaxing, with hands on the inferior belly and breath with assistance of abdominal strength; during breathing in and out, concave-convex of abdomen was performed at frequency of 15 min/time, twice per day; pulmonary rehabilitation with pursed lips breathing-Patients were required to take breath evenly with mouth being tightened up in O shape, for 5 s, guaranteeing the flow strength enough to blow the fire at 20 cm, 15 min/time, twice per day; inspiration should be sustained to the last minute, followed by 2 s of holding their breath and subsequently the expiration. Limb exercise-Patients should take simple exercises initially like walking, jogging or bicycling gradually evolving into the complicated exercises and the amount of exercise should be designed to make patients feel short of breath or heartbeat fast. Rehabilitation lasted for 3 mo. Observation indicators used in the study is as follow. Pulmonary functions before and after treatment-FEV_1 % pre, FEV_1/FVC and Maximal Mid-Expiratory Flow (MMEF); blood-gas indicators before and after treatment-Partial Pressure of Carbon Dioxide ($PaCO_2$), Partial Pressure of Oxygen (PaO_2), arterial pH value; 6 Min Walk Test (6MWT), Activity of Daily Living (ADL) (0 to 100 points, higher scores for better ADL) and modified Medical Research Council (mMRC) score (0 to 4 points, higher scores represent more difficult in breath) before and after treatment; frequency of acute onset within 1 y and frequency of hospitalization due to acute deterioration within 1 y before and after treatment. Pulmonary function was evaluated by use of the SpiroLab III Spirometer (MIR, Italy) and the average of at least three measurements for one indicator was taken as the final result. The fasting arterial blood was drawn for detection of blood-gas indicators, with DH4831 blood-gas analyzer (Beijing Hengrui Tianchuang Instruments Co., Ltd). Statistical Package for the Social Sciences (SPSS) 22.0 software was applied for data analysis. Measurement data were shown in mean±standard deviation and compared by use of t test. Enumeration data were compared by use of chi-square test, $p<0.05$ suggested the statistical significance of difference. Pulmonary functions between two groups were compared. Before treatment, no statistical significance was shown in differences of the pulmonary function indicators between two groups ($p>0.05$), whereas after treatment, significant improvement was identified in the pulmonary function and the improvement in the observation group was much better than that in the control group ($p<0.05$, Table 2). Blood-gas indicators between two groups were compared. Before treatment, no statistical significance was shown in differences of the blood-gas indicators between two groups ($p>0.05$). After the same period of treatment, blood-gas indicators were somehow improved in two groups, with an evident of decrease in $PaCO_2$ and increase in PaO_2 (all $p<0.05$); in the control group, arterial pH value was increased slightly ($p>0.05$), while that in the observation group was increased remarkably when comparing with the level before treatment ($p<0.05$); as for the indicators of $PaCO_2$ and PaO_2, the improvement in the observation group was much better ($p<0.05$, Table 3). Life quality and scores of the symptoms between two groups were compared. Prior to the treatment, comparison over 6MTW, ADL score and mMRC score between two groups showed no significant differences ($p>0.05$). Following the same duration of treatment, significant increase in 6MWT and ADL score were found in two groups ($p<0.05$), with evident decreases in mMRC scores ($p<0.05$) and the improvement in the observation group was more evident than that in the control group ($p<0.05$, Table 4). Comparison of the frequency of acute onset within 1 y between two groups was discussed here. Within 1 y prior to treatment, we compared the frequencies of acute onset and hospitalization of patients between two groups and found no significant differences ($p>0.05$). After treatment, the frequencies in two groups were reduced evidently ($p<0.05$) and the reduction in the observation group was more prominent than that in the control group ($p<0.05$, Table 5). Progression of COPD is affected by various factors and the efficacy of medication on COPD patients in acute phase has been ascertained. However, from the long-term perspective,

medication can hardly reverse the gradual loss of the pulmonary function of COPD patients[5]. Yet, the other problem underlying the medication is the acute decrease in long-term compliance, further facilitating the progression of disease. The long-term stability of life quality is significantly correlated with the symptoms of dyspnea, while objectively, rehabilitation excels in operability, low cost and compliance, so rehabilitation of pulmonary function is available for relieving the dyspnea of patients, thereby improving the life quality of patients[6,7]. Accumulating evidence has shown that on the basis of medication, rehabilitation can improve the activity endurance and the life quality of patients[8]. Similarly, in this study, we also found that rehabilitation following the medication could better ameliorate 6MWT, ADL scores and mMRC scores than the control group, coinciding with the findings of Chu *et al.*[9], suggesting that rehabilitation can improve the life quality of patients. Generally, rehabilitation includes the breath training and limb exercise, emphasizing the improvement in activity tolerance[10,11]. As indicated by the published report, appropriate limb exercise reduces the frequency of acute onset of dyspnea in COPD patients[12]. COPD patients perform poorly in limb exercise, so promoting them to take exercises, like aerobic exercises, is necessary to increasing the activity endurance of them[13]. Zeng *et al.*[14] reported that training of abdominal breath can mitigate the fatigue of breath muscle and reduce the oxygen consumption, while increase the tidal volume; besides, they also noted that abdominal breath training is appropriate for the majority of COPD patients. According to the results of this study, we observed a significant decrease in the hospitalization frequency of COPD patients due to the acute deterioration in the observation group, suggesting that rehabilitation could decrease the acute onset frequency of COPD, which may correlate with improvement of activity tolerance and immunity. Furthermore, in this study, we compared the changes in pulmonary function and blood-gas indicators and as a result, significant improvement of pulmonary function and blood-gas indicators was identified in the observation group, instead of the control group, which similarly, suggested rehabilitation can improve the breath function of patients. Overall, in addition to the irreplaceable position of COPD in treatment, rehabilitation could promote the recovery of COPD patients and reduce the frequencies of acute onset and hospitalization of patients. Thus, it is worthy of being promoted in clinical practice.

TABLE 1: COMPARISON OF THE GENERAL DATA BETWEEN TWO GROUPS (n)

Items	Control group (n=80)	Observation group (n=80)	t/χ^2	p
Male/female	44/36	42/38	0.114	>0.05
Age (years)	58.64±10.61	59.32±9.73	0.395	>0.05
BMI (kg/m^2)	22.37±4.16	22.42±4.25	0.072	>0.05
Disease course (years)	14.93±4.41	15.03±4.53	0.132	>0.05
WBC in peripheral blood ($\times 10^9/l$)	11.07±3.17	11.02±3.26	0.091	>0.05
Neutrophils (%)	77.63±6.41	76.99±6.54	0.585	>0.05
HR (beats/min)	114.26±12.97	113.29±13.15	0.439	>0.05
FEV_1 % pre (%)	51.03±4.93	51.14±4.99	0.13	>0.05
FEV_1/FVC (%)	57.86±4.86	57.97±4.74	0.135	>0.05
Smoking history	36	33	0.263	>0.05

TABLE 2: COMPARISON OF THE PULMONARY FUNCTIONS

Group	N	FEV_1 % pre (%)		FEV_1/FVC (%)		MMEF (l/s)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	80	51.03±4.93	57.93±5.19*	57.86±4.86	61.25±4.97*	1.12±0.19	1.50±0.26*
Observation group	80	51.14±4.99	63.29±5.85*	57.97±4.74	68.47±5.06*	1.14±0.21	1.83±0.30*
t		0.13	6.574	0.135	8.533	0.621	7.21
p		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: *p<0.05 *vs.* the levels before treatment

TABLE 3: COMPARISON OF THE BLOOD-GAS INDICATORS

Group	N	$PaCO_2$ (mmHg)		PaO_2 (mmHg)		Arterial pH value	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	80	62.32±3.69	56.38±3.44*	55.37±4.57	62.96±4.84*	7.27±0.11	7.33±0.13
Observation group	80	62.17±3.63	51.03±3.10*	56.02±4.73	70.22±5.05*	7.28±0.12	7.40±0.14*
t		0.242	9.695	0.828	8.701	0.562	1.309
p		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: *p<0.05 *vs.* the levels before treatment

TABLE 4: COMPARISON OF THE LIFE QUALITY AND SCORES OF THE SYMPTOMS BETWEEN TWO GROUPS

Group	N	6MWT (m)		ADL score (point)		mMRC score (point)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	80	276.36±26.36	308.53±30.55*	55.40±5.27	66.03±5.95*	2.83±0.54	2.26±0.46*
Observation group	80	278.95±27.50	35417±33.29*	55.69±5.35	75.46±6.09*	2.81±0.59	1.81±0.41
t		0.568	8.453	0.323	9.281	0.212	6.252
p		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: *p<0.05 *vs.* the levels before treatment

TABLE 5: COMPARISON OF THE FREQUENCY OF ACUTE ONSET WITHIN 1 y BETWEEN TWO GROUPS

Group	N	Frequency of acute onset		Frequency of hospitalization due to acute deterioration	
		Before treatment	After treatment	Before treatment	After treatment
Control group	80	2.52±0.29	1.94±0.25*	1.21±0.22	0.95±0.18*
Observation group	80	2.49±0.27	1.29±0.21*	1.20±0.25	0.76±0.15*
t		0.633	16.657	0.251	6.784
p		>0.05	<0.05	>0.05	<0.05

Note: *p<0.05 *vs.* the levels before treatment

Conflict of interests:

The authors declared no conflict of interest.

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