

Effects of High-quality Nursing Plus Elastic Band Resistance Exercise on Pulmonary Functions and Quality of Life in Elderly Patients with Chronic Obstructive Pulmonary Disease

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This paper was aimed at exploring the effects of high-quality nursing (HQN) plus elastic band resistance exercise (EBRE) on pulmonary functions and quality of life (QOL) in elderly patients with chronic obstructive pulmonary disease (COPD). Altogether 97 patients with COPD, who came to our hospital for treatment and rehabilitation training from December 2016 to March 2019, were selected and divided into a control group (n=46) and a test group (n=51). Those in the control group were given EBRE plus routine nursing, whereas those in test group were given EBRE plus HQN. The indices of their pulmonary and cardiac functions were assessed. Their negative emotions were assessed and compared between the two groups through the Self-rating Depression Scale (SDS) and the Self-rating Anxiety Scale (SAS). Finally, their adverse reactions, QOL and nursing satisfaction were also assessed and compared. After nursing, the pulmonary functions, the cardiac functions, the negative emotions and the QOL were remarkably improved in both groups, but the improvement of these indicators was more obvious in the test group ($P<0.05$). Compared with the control group, patients in the test group had a remarkably lower incidence of adverse reactions ($P<0.05$), but remarkably higher nursing satisfaction ($P<0.05$). or elderly patients with COPD, HQN plus EBRE can improve the rehabilitation effects on them, and improve their pulmonary functions and QOL, so this combination is worthy of clinical promotion.

Keywords: High-quality nursing, elastic band resistance exercise, elderly patients with COPD, pulmonary functions, quality of life

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INTRODUCTION

As a chronic disease of the respiratory system, chronic obstructive pulmonary disease (COPD) has a high incidence among the elderly¹, mainly characterized by persistent airflow limitation and usually accompanied by incompletely reversible airflow limitation. This causes further degenerative damage to pulmonary functions, thereby limits

patients' activities and even endangers their lives, which seriously affects their quality of life (QOL) and life and health^{2,3}. At present, drug therapies are mainly used for the treatment of COPD, but their therapeutic effects are barely satisfactory with the development of the disease and the increase of patients' exercise intolerance⁴. Therefore, it is essential to develop new

therapeutic schemes and ideas for treating patients with COPD.

In recent years, pulmonary rehabilitation training has been gradually applied to the treatment of COPD, and is conducive to improving the exercise tolerance and cardiopulmonary functions of patients with the disease⁵. As a common way of pulmonary rehabilitation training, elastic band resistance exercise (EBRE) is convenient and effective⁶. In addition to somatic disorders, most patients with COPD are also accompanied by psychological disorders. Therefore, even if some patients have received rehabilitation training, their cooperation is not high and there is no better way to consolidate after the training, which is not conducive to their prognosis⁷. According to previous studies, scientific and effective nursing measures can improve the therapeutic effects on patients with COPD⁸. As a widely used scientific nursing model, high-quality nursing (HQN) has satisfactory effects on treating some diseases. For example, it can improve the negative psychological states of elderly cancer patients and enhance the therapeutic effects on the cancers⁹. Currently, the effects of HQN plus EBRE on patients with COPD have been rarely studied.

Therefore, the effects of this combination on the patients were analyzed, in order to explore more effective therapeutic and nursing schemes for them. The reports are as follows.

MATERIALS AND METHODS

Clinical Data

Altogether 97 patients with COPD, who came to our hospital for treatment and rehabilitation training from December 2016 to March 2019, were selected and divided into the control group and the test group. Those in the control group (n=46) were given EBRE plus routine nursing, whereas those in test group (n=51) were given EBRE plus HQN. Inclusion criteria: Patients who met the diagnostic criteria of COPD were included¹⁰; all patients agreed with this study and signed the informed consent form. Exclusion criteria: Those complicated with ischemic heart

disease and with the history of attacks of angina pectoris; those complicated with pulmonary hypertension; those complicated with malignant tumors; those with other serious organic diseases; those with severe coagulation disorders; those who suffered from communication barriers and did not cooperate in the study. This study has been approved by the Ethics Committee and accords with *Declaration of Helsinki*.

Training and Nursing Methods

All patients carried out the training of EBRE. The elastic bands of unified specification (the resistance was 1.7kg when the stretched length was 100%) were used for training, which was divided into several major sections (upper limb, lower limb and core muscles). Before exercise, warm-up and aerobic exercise were performed under the guidance of a respiratory specialist. The exercise intensity was initially set at 50% of the maximum repetition times¹¹ and 4 points of the BORG scores (moderate dyspnea), 8-20 times/group for 3 groups in total. The interval of each group exercise was 30s, and the exercise time was once/week for 12 weeks in total. The exercise would be stopped when the patients were extremely tired, their BORG scores were greater than or equal to 6 points, and their blood oxygen saturation was lower than 85%.

On the basis of the training of EBRE, the patients in the control group were given routine nursing, which included routine health education, medication guidance and disease monitoring. Those in the test group were given HQN based on the rehabilitation training of EBRE. The specific scheme was as follows. At first, a HQN group was created. According to the qualifications and professional titles of nursing staff, their responsibilities were clarified and a scheduling system was established, to implement the formulated HQN scheme. Psychological nursing: Due to the long course and high recurrence of COPD, elderly patients with the disease are prone to anxiety, depression and other negative emotions. Therefore, the nursing staff actively communicated with the patients, patiently

listened to their complaints, understood their psychological problems, answered their questions, and transmitted positive information to them, so that they could actively cooperate in the treatment and nursing. Condition nursing: During rehabilitation treatment, the nursing staff closely monitored their clinical indicators and condition changes, regularly monitored various indicators, and evaluated their conditions, so as to improve nursing intervention according to their actual situation. Life nursing: The nursing staff helped them develop healthy living habits and pay attention to keep warm and defend cold, as well as urged those with smoking and drinking habits to quit smoking and alcohol. The staff instructed them to eat more light and digestible foods with high-fiber and high-protein, as well as eat more fresh vegetables and fruits. They should avoid eating fried, barbecued and gas-producing foods, and contacting with pollen, dust and other irritating substances.

Outcome Measures

(1) Six-minute walking tests (6MWTs) were conducted on the patients in both groups, and their walking distance was recorded. (2) The pulmonary functions of the patients were tested and compared between the two groups. The indices included forced vital capacity (FVC) and one-second forced expiratory volume (FEV1). (3) The Self-rating Anxiety Scale (SAS) and the Self-rating Depression Scale (SDS)¹² were used to evaluate the patients' negative emotions before

and after nursing. (4) The cardiac functions of the patients were assessed. The indices included maximal metabolic equivalent of task (MET_{smax}), Borg scores¹³ and maximal oxygen uptake (VO_{2max}). (5) During rehabilitation training, the incidence of adverse reactions (dyspnea, nausea, dizziness) was recorded and compared between the two groups. (6) Before and after nursing, the QOL of the patients in both groups was evaluated with the St. George's Respiratory Questionnaire (SGRQ)¹⁴, which was divided into symptom, activity and impact scores. Higher SGRQ scores indicate better QOL. (7) The patients' nursing satisfaction (very satisfied, satisfied and dissatisfied) was evaluated through questionnaires.

Statistical Methods

In this study, SPSS 20.0 (Beijing NDTimes Technology Co., Ltd.) was applied to statistical analysis. Count data were expressed as percentage and compared by a chi-square test. Measurement data were expressed as mean $\pm$ standard deviation, and compared between two groups by a t-test, with the comparison before and after nursing conducted by a paired t-test. When $P < 0.05$, the difference was statistically significant.

RESULTS

Comparison of General Information

There were no significant differences in gender, age and body mass index (BMI) between the test and control groups ($P > 0.05$), which indicates comparability (Table 1).

Table 1.

General information sheet

Factors	Test group(n=51)	Control group(n=46)	χ^2	P
Gender			0.003	0.956
Male	28 (54.90)	25 (54.35)		
Female	23 (45.10)	21 (45.65)		
Age (Years)			0.001	0.973
≤65	22 (43.14)	20 (43.48)		
>65	29 (56.86)	26 (56.52)		
BMI (kg/m ²)			0.014	0.907
≤23	26 (50.98)	24 (52.17)		
>23	25 (49.02)	22 (47.83)		
Complications			0.005	0.997
Diabetes	20 (39.22)	18 (39.13)		
Hypertension	18 (35.29)	16 (34.78)		

Others	13 (25.49)	12 (26.09)		
Course of disease (Years)	2.16±0.54	2.11±0.49	0.060	0.971
History of smoking			0.009	0.923
Yes	26 (50.98)	23 (50.00)		
No	25 (49.02)	23 (50.00)		

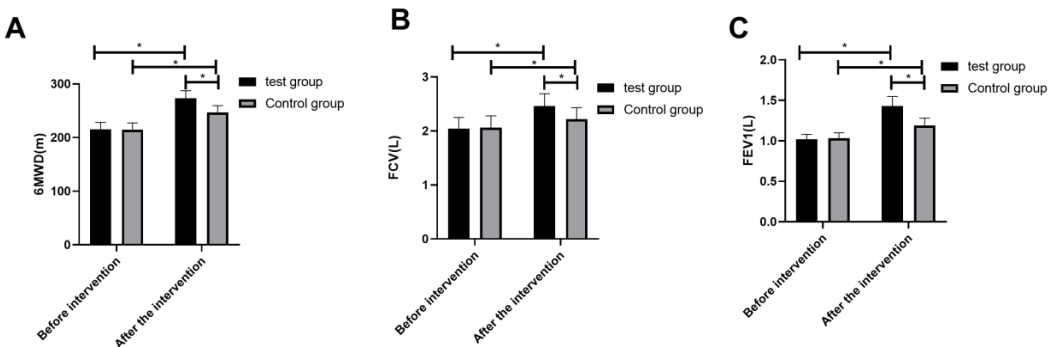
Comparison of Pulmonary Functions before and after Nursing

Before nursing, the differences in 6MWTs and indices of pulmonary functions were not statistically significant between the test and

control groups ($P>0.05$). After nursing, the 6MWTs and the indices in both groups were improved remarkably, but the improvement was more obvious in the test group ($P<0.05$) (Figure 1).

Figure 1.

Comparison of pulmonary functions before and after nursing



A: 6MWTs.
 B: FVC.
 C: FEV1.
 Note: * indicates $P<0.05$.

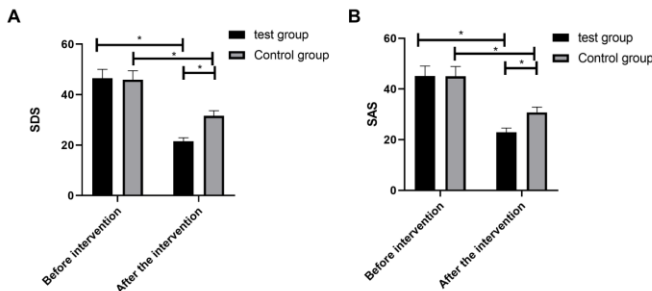
Comparison of Negative Emotions before and after Nursing

The SAS and SDS scores were used to evaluate the patients' negative emotions before and after nursing. Before nursing, the two scores were not

significantly different between the two groups ($P>0.05$). After nursing, the scores in both groups were improved remarkably, but the improvement was more obvious in the test group ($P<0.05$) (Figure 2).

Figure 2.

Comparison of negative emotions before and after nursing



A: SDS.
 B: SAS.

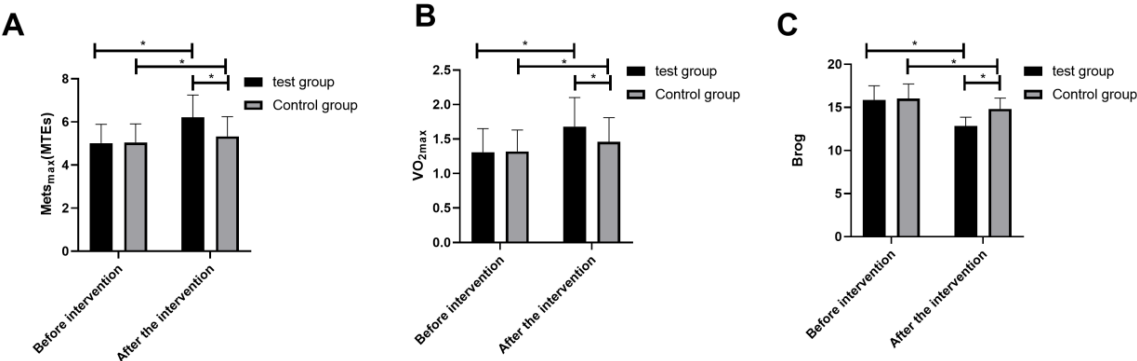
Note: * indicates $P<0.05$.

Comparison of Cardiac Functions before and after Nursing

Before nursing, the differences in $Mets_{max}$, VO_{2max} and Borg scores were not significant between the test and control groups ($P>0.05$).

After nursing, $Mets_{max}$ and VO_{2max} remarkably rose but Borg scores remarkably reduced in both groups ($P<0.01$), but the improvement of the indices was more obvious in the test group ($P<0.05$) (Figure 3).

Figure 3.
Comparison of cardiac functions before and after nursing



A: $Mets_{max}$.

B: VO_{2max} .

C: Borg scores.

Note: * indicates $P<0.05$.

Comparison of Incidence of Adverse Reactions

In the test group, the numbers of patients suffering from dyspnea, nausea and dizziness were 0, 1 and 1, respectively, with the incidence of adverse reactions of 3.92%. In the control group,

the numbers were 2, 4 and 3, respectively, with the incidence of adverse reactions of 19.57%. The incidence of these adverse reactions was remarkably lower in the test group ($P<0.05$) (Table 2).

Table 2.
Comparison of incidence of complications

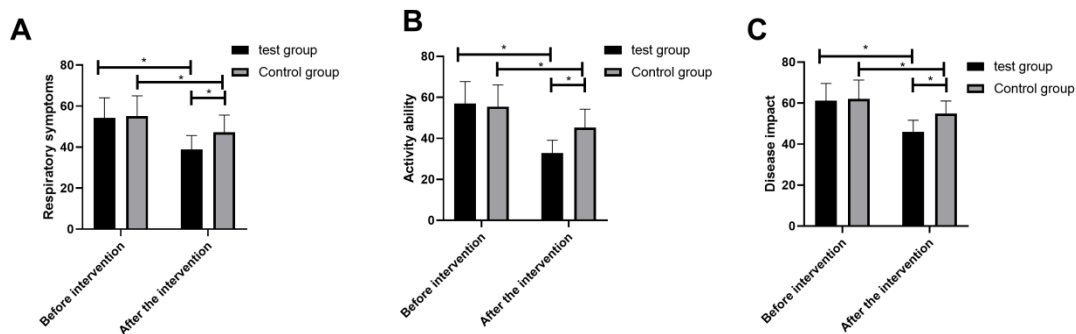
Adverse reactions	Test group(n=51)	Control group(n=46)	X ²	P
Dyspnea	0	2 (4.35)	-	-
Nausea	1 (1.96)	4 (8.70)	-	-
Dizziness	1 (1.96)	3 (6.52)	-	-
Total incidence	2 (3.92)	9 (19.57)	5.887	0.015

Comparison of SGRQ Scores before and after Nursing

Before nursing, the differences in the SGRQ scores were not statistically significant between the test and control groups ($P>0.05$). After

nursing, the symptom, activity and impact scores in the test group were remarkably higher than those before nursing and in the control group ($P<0.05$) (Figure 4).

Figure 4.
Comparison of SGRQ scores before and after nursing



A: Symptom scores.
B: Activity scores.
C: Impact scores.
Note: * indicates $P < 0.05$.

Comparison of Nursing Satisfaction

In the test group, 34 cases were very satisfied, 16 cases were satisfied, and 1 case was dissatisfied with the nursing, with the nursing satisfaction of 98.04%. In the control group, 20 cases were very

satisfied, 12 cases were satisfied, and 14 cases were dissatisfied with the nursing, with the nursing satisfaction of 69.57%. The nursing satisfaction was remarkably higher in the test group ($P < 0.05$) (Table 3).

Table 3.
Comparison of nursing satisfaction [n(%)]

Groups	Test group(n=51)	Control group(n=46)	X ²	P
Very satisfied	34 (66.67)	20 (43.48)	-	-
Satisfied	16 (31.37)	12 (26.09)	-	-
Dissatisfied	1 (1.96)	14 (30.43)	-	-
Nursing satisfaction	50 (98.04)	32 (69.57)	15.00	<0.001

DISCUSSION

COPD is an irreversible disease with persistent airflow limitation. With its gradual progression, the activity tolerance of patients further declines, which limits their activities and seriously affects their QOL ¹⁵. In recent years, the role of pulmonary rehabilitation in the treatment of COPD has been increasingly valued, and the effectiveness of it has also been confirmed ¹⁶. However, many elderly patients are accompanied by cardiac functional diseases because of long-term airway obstruction, which makes them afraid to conduct rehabilitation training easily ¹⁷. Therefore, professional nursing staff are necessary to assist them.

In this study, we analyzed the combination of

pulmonary rehabilitation training and nursing for the first time, and explored the effects of EBRE plus HQN on elderly patients with COPD. As a patient-centered nursing model, HQN puts the service to patients at the top of nursing work, and carries out a series of measures for their treatment and rehabilitation training ¹⁸. In our research, after nursing, the pulmonary functions in both groups were remarkably improved, but the improvement was more obvious in the test group. Then, we evaluated and compared the improvement of negative emotions between the two groups, to further analyze the advantages of HQN. Although the negative emotions in both groups were improved after nursing, the improvement was more obvious in the test group. The elderly suffer from poor physical quality and

low awareness of diseases, so they are more likely to develop depression and anxiety once they get sick; this is unfavorable for them to cooperate in treatment and rehabilitation training, and will affect the therapeutic effects on and the prognosis of them ¹⁹. In our study, a series of measures against patients' negative emotions were taken during the implementation of HQN, so as to build up their confidence in overcoming diseases and help them participate in rehabilitation training more actively. As for the cardiac functions, they were improved in both groups after nursing, but the improvement was more obvious in the test group. As reported by previous studies, rehabilitation training can mobilize patients' muscle groups for sports, enhance their exercise tolerance, and gradually improve their cardiopulmonary functions ²⁰. Rehabilitation training combined with effective nursing not only improves the pulmonary functions of patients with COPD, but also helps to improve their cardiac functions ²¹. These findings are consistent with our research results.

Due to the different exercise tolerance of patients, when conducting EBRE, some patients experience adverse reactions such as nausea and dizziness, which need additional nursing assistance measures for help ²². Therefore, we recorded and compared the adverse reactions between the two groups, and found that the incidence of adverse reactions was remarkably lower in the test group. This suggests that HQN can not only improve the effects of rehabilitation training, but also reduce the incidence of adverse reactions during the training. During the implementation of HQN, we have a more comprehensive grasp of the patients' conditions, adjust training contents in time according to their situation, and help them adapt to the contents slowly, thus reducing the occurrence of adverse reactions and improving prognosis. Finally, we compared the QOL and the nursing satisfaction between the two groups. After nursing, the improvement of the symptom, activity and impact scores in the test group was more obvious than that in the control group. This indicates that

HQN plus EBRE can improve the QOL of patients with COPD more effectively. Besides, the nursing satisfaction in the test group was remarkably better than that in the control group.

In summary, for elderly patients with COPD, HQN plus EBRE can improve the rehabilitation effects on them, and improve their pulmonary functions and QOL, so this combination is worthy of clinical promotion.

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