APPLICATION OF EXERCISE COMBINED WITH LUNG REHABILITATION IN RESPIRATORY DISEASE

APLICAÇÃO DE EXERCÍCIOS COMBINADOS COM REABILITAÇÃO PULMONAR EM DOENÇAS RESPIRATÓRIAS

APLICACIÓN DE EJERCICIOS COMBINADOS CON REHABILITACIÓN PULMONAR EN ENFERMEDADES RESPIRATORIAS

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ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) is a respiratory disease characterized by incomplete reversibility of airflow obstruction and persistent respiratory symptoms. Objective: To explore the therapeutic effect of physical exercise on patients with chronic obstructive pulmonary disease in pulmonary rehabilitation. Methods: Forty-eight experimental subjects were divided into control group, experimental group 1, and experimental group 2 for research. The control group received normal medical-related treatment without any other means of intervention. In addition to normal medical-related treatment, experimental group 1 received breathing training and educational interventions and experimental group 2 received exercise, breathing training and educational interventions. Results: The vital capacity of female subjects before and during the experiment ranged from 2.23±0.01 to 2.26±0.04, the FVC ranged from 2.00±0.02 to 2.01±0.03, the FEV1 ranged from 1.03±0.01 to 1.03±0.01, the FEV1% ranged from 55.50±1.29 to 55.25±1.71, the FEV1/FVC ranged from 51.44±0.24 to 50.84±1.00, and the heart rate ranges from 65.00±0.82 to 65.50 ±1.29. Conclusions: Exercise training can increase the exercise tolerance of patients with COPD, relieve dyspnea, and improve the quality of life. ***Level of evidence II; Therapeutic studies - investigation of treatment results.***

Keywords: Exercise therapy; Chronic obstructive pulmonary diseases; Effect Analysis.

RESUMO

Introdução: A doença pulmonar obstrutiva crônica (DPOC) é uma patologia respiratória caracterizada pela reversibilidade incompleta da obstrução ao fluxo aéreo e sintomas respiratórios persistentes. Objetivo: Explorar o efeito terapêutico do exercício físico em pacientes com doença pulmonar obstrutiva crônica sobre a reabilitação pulmonar. Métodos: Quarenta e oito participantes foram divididos em grupo controle, grupo experimental 1 e grupo experimental 2 para a realização do estudo. O grupo controle recebeu tratamento clínico normal, sem qualquer outra intervenção. Além do tratamento clínico normal, o grupo experimental 1 recebeu treinamento respiratório e intervenções educacionais e o grupo experimental 2 recebeu exercícios, treinamento respiratório e intervenções educacionais. Resultados: A capacidade vital de mulheres antes e durante o experimento variou de 2,23 ± 0,01 a 2,26 ± 0,04, a CVF variou de 2,00 ± 0,02 a 2,01 ± 0,03, o VEF1 variou de 1,03 ± 0,01 a 1,03 ± 0,01, o VEF1% variou de 55,50 ± 1,29 a 55,25 ± 1,71, a VEF1/CVF variou de 51,44 ± 0,24 a 50,84 ± 1,00, e a frequência cardíaca variou de 65,00 ± 0,82 a 65,50 ± 1,29. Conclusões: O treinamento físico pode aumentar a tolerância ao exercício de pacientes com DPOC, atenuar a dispneia e melhorar a qualidade de vida. ***Nível de Evidência II; Estudos terapêuticos - Investigação dos resultados do tratamento.***

Descritores: *Terapia por exercício; Doença pulmonar obstrutiva crônica.*

RESUMEN

Introducción: La enfermedad pulmonar obstructiva crónica (EPOC) es una patología respiratoria caracterizada por la reversibilidad incompleta de la obstrucción del flujo aéreo y la persistencia de síntomas respiratorios. Objetivo: Explorar el efecto terapéutico del ejercicio físico en la rehabilitación pulmonar en pacientes con enfermedad pulmonar obstructiva crónica. Métodos: Cuarenta y ocho participantes fueron divididos en grupo de control, grupo experimental 1 y grupo experimental 2 para el estudio. El grupo de control recibió tratamiento clínico normal sin ninguna otra intervención. Además del tratamiento clínico normal, el grupo experimental 1 recibió entrenamiento respiratorio e intervenciones educativas y el grupo experimental 2 recibió ejercicios, entrenamiento respiratorio e intervenciones educativas. Resultados: La capacidad vital de las mujeres antes y durante el experimento osciló entre 2,23 ± 0,01 y 2,26 ± 0,04, la FVC entre 2,00 ± 0,02 y 2,01 ± 0,03, el FEV1 entre 1,03 ± 0,01 y 1, 03 ± 0,01, el FEV1% varió de 55,50 ± 1,29 a 55,25 ± 1,71, la FEV1/FVC varió de 51,44 ± 0,24 a 50,84 ± 1,00, y la frecuencia cardíaca varió de 65,00 ± 0,82 a 65,50 ± 1,29. Conclusiones: El entrenamiento físico puede aumentar la tolerancia al ejercicio en pacientes con EPOC, atenuar la disnea y mejorar la calidad de vida. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de los resultados del tratamiento.***

Descriptores: *Terapia por ejercicio; Enfermedad pulmonar obstructiva crónica.*

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is an important chronic respiratory disease that seriously endangers the health. Because of the large number of patients, the insidious onset, the high mortality rate and the heavy social and economic burden, it has become an important public health problem in various countries.[1] The American Thoracic Society (ATS) and the European Respiratory Society (ERS) pointed out that pulmonary rehabilitation is an individualized comprehensive intervention program designed for patients with symptomatic chronic lung damage based on evidence-based medicine, combined with multiple disciplines.[2] Pulmonary rehabilitation focuses on alleviating patient symptoms, optimizing functional status, and increasing participation rate, by stabilizing or reversing the clinical manifestations of the disease, it can reduce symptoms, optimize functional status, improve the ability to participate in daily and social activities, and reduce medical expenses.[3] As an effective and important non-drug treatment, pulmonary rehabilitation currently has no unified model, which mainly includes patient assessment, exercise, nutrition guidance, health education, psychological support, and behavioral intervention.[4,5] As the core of pulmonary rehabilitation, exercise can effectively improve symptoms such as exercise capacity, dyspnea and fatigue, but due to the patient's ventilation and diffusion dysfunction, skeletal muscle hypoxia and exercise weakness are caused.[6] In actual operation, it is difficult for patients to persist for a long time.[7] The lack of exercise accelerates the deterioration of lung function and muscle strength, aggravates the depression and anxiety of patients, and forms a vicious circle.[8]

METHOD

Research objects

Patients with stable mild chronic obstructive pulmonary disease who were discharged from a hospital from May 2020 to June 2020 were the research subjects, and there was no recurrence within two months. Talking about the questionnaire and exclusion conditions, the control group dropped 1 person during the experiment, the experiment 1 group and the experiment 2 both dropped 1 person during the experiment, and finally 48 patients with chronic obstructive pulmonary disease were left as experimental subjects. The remaining 16 people in the control group: The remaining 16 people in experiment 1 group; The remaining 16 people in the experiment 2 group.

Method

1. Experimental method

The main test indicators for subjects in the experiment are lung function test indicators (forced vital capacity in the first second (FEVI), forced vital capacity (FVC), and the ratio of forced vital capacity to forced vital capacity in the first second (FEVI/FVC).), BNI, heart rate, maximum oxygen uptake, measurement of walking distance in minutes, and dyspnea classification score, through the relevant data of the test indicators, conduct experimental research to understand the changes of the subjects' indicators and the improvement of the subjects' living abilities.

RESULTS

Analysis of the subjects' lung function test indicators before the experiment

It can be seen from Table 1 that before the experiment, the lung capacity, FVC, FEV1, FEV1%, FEV1/FVC and heart rate of the experimental subjects were tested, use the data to analyze the test results, the analysis results show that there is no difference between the data of each group, the following experimental research can be carried out.

In the study, the exercise ability of the experimental subjects is mainly to test the 6-minute walking distance of the experimental subjects, and a total of 3 tests with the same lung function index are carried out, respectively, before the experiment, the middle of the experiment and after the experiment. (Table 2)

Analysis of the impact of exercise rehabilitation on the lung function of the subjects

1. Analysis of the lung function test indicators of subjects in the middle of the experiment

After 3 months of experimental research, the experimental subjects were tested again, and the data obtained was compared with the relevant data before the experiment. The analysis results are shown in Table 3.

In the 3-month experimental study, 16 subjects in the control group were mainly subjected to necessary medical treatment.

2. Analysis of Experimental Indexes of Subjects' Pulmonary Function in the Late Period of the Experiment

It can be seen from Table 4 that in the 6-month experimental study, the 16 subjects in the control group mainly received necessary medical treatment. There was no intervention by other means in the experimental group. The data of patients with chronic obstructive pulmonary disease before and after intervention in the experimental group showed a significant upward trend, indicating that exercise has a certain impact on the lung function of patients with chronic obstructive pulmonary disease. Studies have shown that interventions can directly or indirectly improve lung function, thereby improving respiratory function. The density distribution is shown in Figure 1.

DISCUSSION

Analysis of the exercise ability of the subjects in the later stage of the experiment

It can be seen from Table 5 that after 6 months of experimental research, all subjects were statistically analyzed in the middle of the experiment. The distance of the male subjects in the control group ranged from 280.90±5.08 to 281.61±5.22 in 6 minutes, the 6-minute walking distance of the female test subjects ranged from 2S1.71±3.89 to 252.10±4.99, the 6-minute walking distance of the men and women in the control group increased, but the increase was not large, and there was no significant difference; The distance of male subjects in experiment group 1 ranged from 282.63±5.84 to 288.81±4.12 in 6 minutes, and the distance of female subjects ranged from 252.01±4.87 to 257.9011.94 in 6 minutes, the 6-minute walk distance of men and women in the

Table 1. Pre-experimental pulmonary function test index analysis table (N=16) ($\bar{x} \pm s$).

	Control group		Experiment 1 group		Experiment 2	
	Man	Women	Man	Women	Man	Women
Vital capacity (L)	2.50±0.04	2.23±0.01	2.50±0.05	2.23±0.02	2.50±0.03	2.23±0.01
FVC (L)	2.44±0.04	2.00±0.02	2.44±0.04	2.01±0.02	2.44±0.03	2.01±0.03
FEV1 (L)	1.25±0.01	1.03±0.01	1.25±0.01	1.03±0.02	1.25±0.01	1.03±0.01
FEV1%	54.92±1.24	55.50±1.29	55.00±0.95	55.25±1.26	55.08±1.24	55.75±0.96
FEV1/FVC	51.08±0.60	51.44±0.24	51.10±0.65	51.12±0.32	51.15±0.47	51.44±0.38
Heart rate (times/min)	62.92±1.16	65.00±0.82	63.08±1.16	65.25±0.50	62.83±1.19	65.25±0.96

Table 2. Statistical analysis table of the distance the subjects walked in 6 minutes before the experiment (N=16) ($\bar{x} \pm s$).

	Control group		Experiment 1 group		Experiment 2	
	Man	Women	Man	Women	Man	Women
6 minutes walk (m)	280.90±5.08	251.71±3.89	282.63±5.84	252.01±4.87	281.56±4.27	251.42±4.12

Table 3. Analysis of relevant test indicators of lung function of subjects before and after the experiment in the control group in the middle of the experiment (N=16) ($\bar{x} \pm s$).

		Vital capacity (L)	FVC (L)	FEV1 (L)	FEV1%	FEV1/FVC	Heart rate (times/min)
Before the experiment	Man	2.50±0.04	2.44±0.04	1.25±0.01	54.92±1.24	51.08±0.60	62.92±1.16
	Women	2.23±0.01	2.00±0.02	1.03±0.01	55.50±1.29	51.44±0.24	65.00±0.82
After the test	Man	2.49±0.04	2.44±0.04	1.25±0.01	55.00±0.60	51.13±0.36	63.08±0.90
	Women	2.24±0.01	2.01±0.02	1.03±0.01	55.00±0.82	51.49±0.20	62.25±0.50

Note: When P<0.05, use * to indicate: When P<0.01, use ** to indicate.

Table 4. Analysis of related experimental indicators of lung function of subjects before and after the experiment in the control group in the later stage of the experiment (N=16) ($\bar{x} \pm s$).

	Control group		Experiment 1 group		Experiment 2	
	Man	Women	Man	Women	Man	Women
Vital capacity (L)	2.50±0.04	2.23±0.01	2.49±0.04	2.24±0.01	2.50±0.04	2.26±0.04
FVC (L)	2.44±0.04	2.00±0.02	2.44±0.04	2.01±0.02	2.44±0.03	2.01±0.03
FEV1 (L)	1.25±0.01	1.03±0.01	1.25±0.01	1.03±0.01	1.25±0.01	1.03±0.01
FEV1%	54.92±1.24	55.50±1.29	55.00±0.60	55.00±0.82	55.08±1.38	55.25±1.71
FEV1/FVC	51.08±0.60	51.44±0.24	51.10±0.36	51.49±0.20	51.03±0.39	50.84±1.00
Heart rate (times/min)	62.92±1.16	65.00±0.82	63.08±0.90	65.25±0.50	63.00±1.04	65.50±1.29

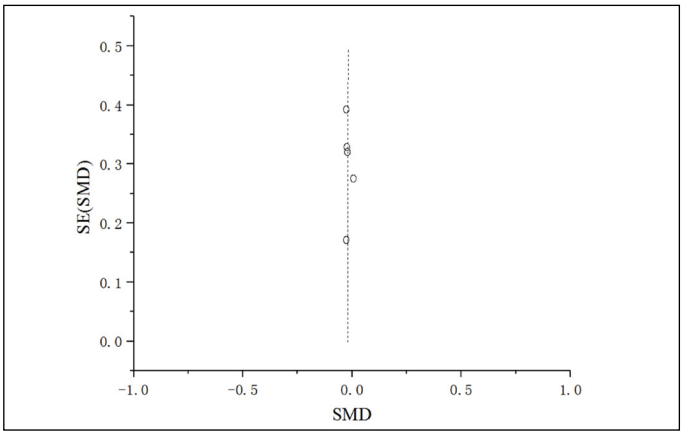

Figure 1. The change of FEVI% in the experimental group before and after exercise intervention.

Table 5. Research analysis of subjects who walked 6 minutes later in the experiment (N=16) ($\bar{x} \pm s$).

	Control group		Experiment 1 group		Experiment 2	
	Man	Women	Man	Women	Man	Women
Before the experiment	280.90±5.08	251.71±3.89	282.63±5.84	252.01±4.87	281.56±4.27	251.42±4.12
After the experiment	281.16±5.22	252.10±4.99	288.81±4.12ΔΔ**	257.90±1.94Δ**	291.67±3.90ΔΔ!!#	263.64±2.81ΔΔ!!##

experiment 1 group P<0.01, there is a difference, compared with the control group that simply maintains the basic status of the experimental subjects, breathing training and comprehensive education training methods have an impact on the subjects' 6-minute walking, and have a very obvious impact on the improvement of the subjects' exercise ability.[9-10]

CONCLUSION

In summary, exercise training can enhance muscle aerobic metabolism, increase muscle mass and strength, and improve muscle endurance; Reduce lactic acid levels, reduce minute ventilation and ventilation requirements; Increase stroke volume, reduce heart rate, and improve heart function. Studies have confirmed that exercise training can increase the exercise tolerance of patients with COPD, alleviate dyspnea, and improve the quality of life.

All authors declare no potential conflict of interest related to this article

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