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Cognitive Behavioral Therapy: A Strategy for Depressive Moods Reduction of in Patients Experiencing Chronic Obstructive Pulmonary Emphysema Disease

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Abstract: Patients with Chronic Obstructive Pulmonary Disease (COPD) often experience difficulty breathing, decreased exercise tolerance and respiratory function as the disease progresses. Pulmonary rehabilitation training can improve respiratory symptoms, increase exercise tolerance and quality of life through exercise stimulation.However, after the end of pulmonary rehabilitation training, the patient's movement behavior is not easy to maintain.Cognitive behavioral therapy (CBT) can effectively enhance cognition, strengthen the motivation of "regular motor behavior", and maintain motor behavior, which can be used as a maintenance strategy for pulmonary rehabilitation training.Objective: To study the effect of cognitive behavioral therapy on the rehabilitation effect and the changing stage of "regular motor behavior" in COPD patients.Methods: 30 patients consulted in the Rehabilitation Department of the Third Veterans Hospital of Sichuan Province were interviewed by telephone, and the exercise status and rehabilitation status were recorded and analyzed.From 30 patients, severe and extremely severe (GOLD grade III-IV) in motivation period of "regular exercise behavior" (not starting regular exercise but had exercise thoughts) were randomly divided into two groups. Pulmonary rehabilitation group (CBT-PR group, n=15) conducted one-to-one CBT intervention for 30-40 minutes to discuss the reasons for regular exercise and teach exercise precautions and principles using exercise education form; conventional pulmonary rehabilitation group (conventional PR group, n=15) conducted intensive pulmonary rehabilitation education without consultation and discussion.Both groups underwent 4 weeks of outpatient rehabilitation training, And the regular exercise ability was detected in the first and third months after training (6-Minutes Walking Distance, 6-WMD; Short Physical Performance Battery, SPPB), (International Physical Activity Questionnaire, IPAQ), (St. George's Respiratory Scale, St.George's Respiratory Questionnaire, SGRQ), change.

Keyword：Cognitive Behavioral Therapy; Chronic Obstructive Pulmonary Emphysema Disease; SPSS25.0; Reduction; Strategy; Depression; Pulmonary rehabilitation

1 Introduction

In all patients with chronic diseases such as COPD, diabetes and cardiovascular disease, psychological problems are an important predictor of patient treatment, increased hospitalization and increased mortality, especially depression. Compared with other chronic diseases, the characteristics of repeated and prolonged COPD and various complications caused by COPD seriously affect mental health, and psychological problems such as anxiety and depression are more common than other chronic diseases, but they are not fully diagnosed and treated for.Negative emotions, such as anxiety and depression, can reduce adherence to medication and pulmonary rehabilitation activities（Yuan Yuehua Interpreting New Lung Rehabilitation: A Guide to Success (4th Edition/Translated Edition）, and are an important indicator of whether COPD patients are willing to participate in medical and comprehensive treatment measures that can benefit them . ACOPD is the most common cause of hospitalization, so it is extremely important to implement positive emotional management during hospitalization. In recent years, psychosocial support has been increasingly valued as one of the core elements of COPD pulmonary rehabilitation (PR). The National Institutes of Health and the European Respiratory Society have emphasized that in order to achieve the success of PR, more attention should be paid to solving pathophysiological problems.

2 Inclusion / exclusion criteria

The main inclusion criteria for the potential participants in this study were as follows:

1) Age was between 60-90 years old.

2) In line with the Global Initiative for chronic obstructive pulmonary disease (G0LD),C0PD should have four key indications: frequent chronic cough; expectoration for at least 2 years and at least 3 consecutive months per year; persistent increasing dyspnea and risk factors that can explain the disease。

3) Grade 3 and 4 patients were selected by international GOLD classification: GOLD 1-mild, FEV 180% predicted; GOLD 2-moderate: 50% predicted FEV 1 <80% predicted;

GOLD 3-severe: 30% predicted FEV 1 <50% predicted; GOLD 4-extremely severe: FEV 1 <30% predicted.

4) Patients with COPD with depressive status qualify with the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).

5) Patients with interval pulmonary rehabilitation training or who cannot undergo continuous pulmonary rehabilitation training.

6) No hearing impairment or eye disease.

7) Ability to provide a written informed consent form.

8) No cognitive impairment was found (MMSE score higher than 27).

9) No history of mental illness.

Exclusion criteria：Excluded: Potential participants who met one or more of the following criteria.

1) Age < 60 years old and > Ninety years old.

2) Patients in the acute phase of COPD.

3) Poor understanding ability, unable to complete psychological intervention.

4) Patients with neurological diseases such as Parkinson's, epilepsy, migraine, etc.

5) Patients with cerebrovascular diseases.

6) Personality disorder.

7) Bipolar disorder.

8) Schizophrenia.

9) Do not agree to participate in the research.

10) Dementia, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V).

Other neurological diseases that can cause cognitive decline (except suspected early AD), including Parkinson's disease, vascular dementia, Huntington's disease, positive pressure hydrocephalus, brain tumors, progressive supranuclear paralysis, epilepsy, subdural hematoma, multiple sclerosis or traumatic brain injury leading to nerve damage and other structural brain abnormalities. Other systemic diseases that can cause cognitive decline include bridging nature encephalopathy, metabolic encephalopathy, paralytic dementia, anemia, hepatic encephalopathy, renal encephalopathy, etc.

Clinical lung CT showed infection or lung tumors.

Heart pacemaker, aneurysm clips, artificial heart valves, ear implants, metal fragments or eyes, foreign matter in the skin or body.

History of alcohol or drug abuse/addiction within the past 2 years (DSMV diagnostic criteria).

The project could not be completed due to any other systemic disease or uncertain conditions.

3 Pulmonary function test equipment and method

The Japanese Meileng lung function detector (AS-507) was adopted, and the technical performance parameters were:

Flow rate sensor: hot wire flow rate sensor of platinum-rhodium alloy

Flow range and accuracy :0-14L/S; Reading value ±3% or ±0.01 L/S

Maximum capacity :10 litre

Predicted value formula :EUROPE, BEIJING, LAM-CHINA, BALDWIN

Capacity accuracy :±3% or 50 ml

Display: 5.7-inch color LCD touch screen

Power supply :220/240V;

Diagnosis: GOLD(2003 edition) was used to classify COPD. The test results are detailed and graphically rich (including COPD diagnostic charts and zigzag and star charts)

Storage: up to 200 complete test reports can be saved

Printer: built-in thermal printing; 57mm wide web;

Off-forehead: Blood oxygen saturation sensors measure blood oxygen saturation and pulse numbers; The respiratory muscle strength test measures expiratory and inspiratory muscle strength. RS-232C interface, connected to the computer to print A4 or B5 output;

Other: International quality certification ISO 9001:2000 ISO 13485:2003. Force vital capacity (FVC) and vital capacity (VC) can be measured.

Lung function Pulmonary function tests were all performed by the same technician in the pulmonary function room, and the patients were uniformly seated. The main monitoring indicators of this study were dyspnea index, CAT value, FVC% predicted, FEV 1% predicted. ,The main tests: forced vital capacity (FVC), VC, TV, IRV, ERV, IC; when input FRC value, can calculate RV, FRC, TLC, RV / TLC; ventilation per minute (MV): MV, RR, TV maximum ventilation (MVV) per minute: MVV, BSA, MVV / BSA, RR, TV。Check once a week and keep a record。

Pulmonary rehabilitation training course and precautions: the rehabilitation training lasts for 4 weeks, 5 times a week, about 40-60 minutes / time. Including respiratory rehabilitation, aerobic exercise, and lower limb muscle strength training. All exercises were performed under monitoring, mainly monitoring heart rate and blood oxygen. Set exercise termination criteria as follows: ① Chest tightness, palpitations, cyanosis and other symptoms and signs or feel extreme fatigue or wheezing, can not continue training. ② Sp O2 ＜ 90%。③ Heart rate> 80% HRmax.

Respiratory muscle training: inspiratory muscle strength training using the inspiratory muscle training instrument (Power Breathe K5, UK). The specific plan is as follows: 30 inspiratory muscle strength training for each training, the interval of each inspiratory training is not less than 6s, the first inspiration of each training without resistance, the device automatically measures the maximum suction pressure (Maximum inspiratory pressure, MIP) of the patient and gradually increases the inspiratory resistance in the subsequent training, the resistance is 10-30% of MIP. If the resistance is too high or too low during the training process, it can also be manually adjusted by the rehabilitation therapist. During the training process, the equipment can reflect the inspiratory pressure and inspiratory capacity in real time, and the therapist can guide the patient accordingly to ensure the training quality. Once daily, 5 times / week, training for approximately 15 minutes.

Respiratory method adopts abdominal / lip contraction breathing method: the patient takes a comfortable sitting position, tells the patient to relax the lips, one hand on the chest, the other hand on the upper abdomen, the mouth and nose simultaneously inhale to the maximum extent, a little breath or no breath. During inspiration, the diaphragm drops and the abdomen is convex. During expiration, the diaphragm rises and the abdomen is concave. If the patient, the abdomen is raised earlier and the chest is more obvious. After inhalation, the patient was transferred to shrink the lips and exhale. The method was for the patient to whistle and slowly exhale for about 4-6s, and the degree of lip contraction during expiration was adjusted by the patient himself. Each training

session was guided for 5 minutes, with a breathing rate of 7 breaths per minute.

Aerobic exercise training: using sitting treadmill (Moto Med, Germany), exercise prescription is as follows:

Exercise form: intermittent exercise, exercise / rest time: 30 seconds / 30 seconds, set the warm-up speed level of 30 RPM, the device automatically turns into passive mode, told the patient to actively exercise for 30 seconds, rest for 30 seconds cycle, the patient tried to increase the speed to 60-70 RPM during active exercise.

Exercise intensity: Exercise intensity was determined by heart rate method: target rate =60-80% [(HRmax-resting HR) + resting heart rate]. If the patient's resting heart rate exceeds the target rate, the exercise center rate should increase no more than 10 times / min. Exercise resistance is set to torque 3-10 Nm, power during exercise is about 20-60 watts, and passive activity at 30 rpm at rest (exercise power <5 watts).

Time and frequency: 4 weeks training; 5 times / week; 12 min / time start increase, gradually increased to 30-40min / time according to patient tolerance level.

Lower limb muscle strength training: is okinetic muscle strength training equipment (Biodex Multi-Joint System 3) was used to train bilateral lower limb muscle strength of patients. The training adopts the sitting position, the sitting position is adjusted to 115 according to the training equipment, aligned with the center of the lateral femoral condyle and the rotating shaft of the power arm of the test system, and the resistance pad at the end of the power arm is fixed at the bottom of the test leg. Before training, the knee motion range is set according to the actual situation, about 0-110 groups, 10,120 seconds, angular velocity of 60 / s; 90 / s and 120 / s respectively. During the training, patients are required to bend and extend the knee joint with maximum strength, and patients are reminded not to hold their breath.2-3 times a week for about 10 minutes.

Cognitive behavior training: the first time, recognize and understand depression and formulate treatment methods; the second time, identify automatic thinking and activate behavior; the third time, against distorted cognitive and functional behavior; the fourth time, change the attribution mode and task decomposition; the fifth time, find the core beliefs and problem solving; the sixth time, review objectives and plans, deal with setbacks and prevent recurrence.（Wang Qiang Chinese Neurology）

4 Participants of the Study

In this study, 30 patients with COPD and depression were treated in the rehabilitation Department of the Affiliated Hospital of Chengdu University of Traditional Chinese Medicine. The experiment was randomly divided into CBT (N=15) and CBT-PR (N=15). spss25.0 statistical software was used for preliminary data sorting, input, sorting and analysis.

4.1 Methods: Participant, treatment, and outcome

This will be a single-center, randomized, controlled trial at the Affiliated Hospital of Chengdu University of Chinese Medicine. The results of two groups (CBT and CBT + PR) will be analysed. Patients with COPD and depression will be randomly divided into control and treatment groups. Has been approved by the Responsible Institutional Ethics Review Committee and will be implemented in accordance with the institutional ethical standards of the Declaration of Helsinki.

4.2 Data-gathering Procedure

In this study, the questionnaire will be distributed in the form of online survey. First, the questionnaire star software is used to edit the questionnaire and form a questionnaire website link, and then the researchers will send the website to the respondents through the network platform. In addition, the respondents used their mobile phones or computers to fill out the electronic questionnaire online according to the actual situation. Each Ip address setting can only answer once, preventing patients from repeatedly submitting the questionnaire. Participants were fully voluntary and submitted the questionnaire anonymously, without name and identity information. The answer time was automatically recorded from the time of the patient to the time when the questionnaire was submitted. If the answer time was less than 180 seconds, the questionnaire was considered invalid. The test method is to evaluate depressive status and lung function at 4,6, weeks before and after CBT, PR, and CBT-PR.

4.3 Data Processing and Analysis

All the data in this paper were analyzed by the use of SPSS25.0 software package. The main statistical analysis was as follows: Descriptive statistics were made on the total score of depression state and the scores of each factor. The results of possible differences caused by lung function variables were analyzed by T-test, analysis of variance, and compared. The relation between CBT, PR, lung function, and depression status were investigated by correlation analysis and regression analysis.

Descriptive statistics: to describe the current situation of COPD patients with depression by mean and standard deviation.

T-test: Independent sample t-test for differences in individual COPD variables (age, sex, BMI, psychotherapy, PR, COPD duration, repeated hospitalizations, previous depression). Group differences before and after CBT were analyzed by independent sample t-test; group differences before and after PR were analyzed by paired sample t-test; group differences before and after CBT-PR were analyzed by sample t-test.

Analysis of variance: Analysis of variance with multiple samples to analyze the differences between CBT, PR and CBT-PR.

Correlation analysis: The relationships between lung function, CBT, PR, and depression index were analyzed by Pearson (Pearson) product-differential correlation.

Multiple regression analysis. To quantitatively characterize the linear dependence between dependent variables and multiple independent variables in this study using regression equations.

5 Findings

5.1 finding 1

5.1.1 Basic document

The basic data of the subjects included age, sex, number of repeated hospitalizations, cigarette age, vital capacity (vc), total lung (tcl), residual volume (RV) / total lung (TCL), maximum ventilation (MVV), forced expiratory volume in one second (FEV 1), depression index,（Table 1 for details）

Table 1: Basic condition of COPD patients

Project	bear fruit	%
Age	62.14±9.32	
Sex	Male 19	63.3
	Female 11	36.7
Smoke age (year)	32.35±10.22	
Total capacity lung(tcl)	6500±660ml	
Residual air volume (RV) / Total lung (TCL)	46%-55%	
Maximum Aeration Volume (MVV)	80 ± 18L/ l per min	
Cardiac lung function	Forced expiratory volume in one second (FEV 1)	75% ± 12
	dyspnea inde 4-5 Points	90
	caT value 21-30	90
	Fvc 2400+288	
Depression index	30±7	
Duration of CPOD (grouping)	1-2years 13	43.3
	3-4years 17	56.7
number of recurrent hospitalization	1-2 times in a year 11	36.7
	3 -4 times in a year 19	63.3
previous experience of depression	1-2 times 22	73.3
	3 -4 times 8	26.7

5.1.2 The status of the motor rehabilitation of the survey subjects

This study focused on motor behavior in the Questionnaire on Stable Treatment of COPD patients. The results showed that 33 (73.33%), 12 (26.67%), 42 (93.33%), and 3 (0.06%) had regular exercise (see Figure 3 for details). To further explore the main reasons for the inactive patients (n=33), we found that n=30 (90.9%), symptom factors (e. g., asthma, cough, fatigue) n=6 (13.33%), and environmental factors n=5 (11.11%) (see Figure 4 for details). But did not reach the regular exercise, 11 intensity did not meet the standard, 10 time not reaching the standard, 9 frequency did not meet the standard, and 28 non-aerobic exercise. (Table 2 for details).

Table 2: **Pulmonary rehabilitation of the survey subjects**

		number of people	Occupy% than
Pulmonary rehabilitation	Basically not exercise	27	90%
	Regular exercise rehabilitation	3	10%
Regular pulmonary rehabilitation status	Irregular exercise rehabilitation	29	97%
	Regular exercise rehabilitation:	1	3 %
The main reasons for non-exercise rehabilitation	environmental factors	4	13.3%
	physical causes	3	10%
	Don't know pulmonary rehabilitation	27	90%

5.1.3 Rehabilitation knowledge of the respondents

Among the 30 COPD patients, 21 cases were aware of pulmonary rehabilitation, accounting for 68%，9 cases were unknown, accounting for 32%. The main reason for knowing pulmonary rehabilitation but not undergoing rehabilitation training (n=21) was the cost of medical treatment, n=15, and the distance was too high Far n=2, no want to recover n=2, no time n=2.

motor rehabilitation of the survey subjects	21 70%	Unknown Pulmonary rehabilitation	9 30%
main reason	cost of medical treatment	15	
	Too far	2	
	N0 want to	2	
	No time	2	

5.2 Finding 2

5.2.1 Basic document

This study was divided into 15 people from CBT-PR group and conventional PR group. The basic data of the two groups did not differ between groups (P> 0.05), which was comparable ment （Table 3 ）.

Table 3: **Basic data of patients in both groups**

Project	CBT-PR	PR	P
	Number of people（%）	Number of people （%）	
Sex	Male 10 （66.67%）	Male 9(60%)	
	Female 5(33.33%)	Female 6(40%)	
Age	61.35±6.82	61.35±6.82	0.83
BMI	61.35±6.82	61.35±6.82	0.73
GOLD Grade	3 Level 9(60%)	3 Level 9(60%)	1.0
	4 Level 6(40%)	4 Level 6(40%)	
Occupation	Yes 8(53.33%)	Yes 4(26.67%)	0.15
	No 7(46.67%)	No 11(73.33%)	
Marital status	Unmarried 0 (0%)	Unmarried 0(0%)	
	Married 12(80%)	Unmarried 1(80%)	
	Dissociato 2(13.33%)	Dissociato 1(6.67%)	
	widowed 1 (6.67%)	Widowed 2(12.33%)	
Other chronic diseases	Yes 12(80%)	Yes 11(73.33%)	0.68
	No 3 (20%)	No 4(26.67)	

5.2.2 Results of observation indicators before rehabilitation training

The Fisher` s method and the continuity variables were used to determine the Q-Q plot Fruit shows all variables conforming to a normal distribution. Independent sample t-test was used to compare the rehabilitation training in the two groups There were no significant differences in anterior exercise capacity, weekly exercise and quality of life, and lung function (P> 0.05), with a comparable（Table 4 ）.

Table4: Results of observation indicators before rehabilitation training

Item		CBT-PR	PR	P
6-MWT	6-MWD(m)	350.01±39.28	368.87±61.68	0.32
	Borg Gas promotion scale	7.80±0.86	8.07±0.80	0.36
	Borg Fatigue scale	7.53±1.06	7.60±0.91	0.86
	△ HR	31.33±10.03	35.93±9.34	0.20
SPPB Score	Total	6.33±1.05	6.33±1.13	1.0
	Balance ability test	2.07±0.96	1.93±0.88	0.71
	Walking speed test	2.67±0.82	2.87±0.64	0.42
	Lower limb strength test	1.60±0.51	1.53±0.52	0.71
	IPAQ grade	3731.13±187.78	3808.20±111.85	0.84
SGRQ	Total points	54.34±14.01	50.44±14.75	0.51
	Disease effects	46.33±18.85	38.49±14.86	0.22
	limitation of movement	62.05±17.55	63.16±15.03	0.85
	Symptoms limit	53.94±19.71	48.10±17.74	0.40
Lung function	FVC%Pre	49.11±8.56	44.46±11.94	0.23
	FEV1%Pre	44.37±10.16	51.29±9.72	0.07
	FEV1/FVC(%)	64.49±12.23	68.17±8.14	0.34

5.2.3 Changes in the motor capacity

Changes in the 6-WMT :

1) The two groups showed a significant improvement in 6-WMD before and after rehabilitation training, with statistical differences (P < 0.01); 6-No other MWT.（P ＞ 0.05）.

2) There were no statistical differences between 6-WMT (P> 0.05）.

3) The CBT-PR group had a significant increase compared with the 6-WMD time group of the conventional PR group, with a statistical difference Different (P <0.01); no statistical difference in the remaining index time group of 6-WMT (P> 0.05). Detailed data are detailed in Table 5.

Table 5: Changes in the 6-WMT

Item	Before rehabilitation	1 month after rehabilitation
6-MWD(m)	350.01±39.28	499.40±60.98
Borg Gas promotion (scale)	4.80±0.86	4.13±0.74
Borg Fatigue (scale)	6.53±1.06	6.20±0.78
△ HR2	31.33±10.03	41.60±7.70
6-MWD(m)	368.87±61.68	486.53±58.29
Borg Gas promotion (scale)	4.07±0.80	4.87±0.83
Borg Fatigue (scale)	6.60±0.91	6.01±0.93
△ HR	35.93±9.34	45.13±7.65

The change in the SPPB :

1） The total score of SPPB before and after rehabilitation training increased significantly, which showed a statistical difference (P <0.01); no statistically significant difference in walking pace.（P ＞ 0.05）.

2）There were no statistical differences between the two groups of SPPB indicators after rehabilitation training (P> 0.05).

3） The CBT-PR group showed significant improvement compared with the conventional PR group, SPPB, and the total time score group, with statistics Differdifference (P <0.01) are detailed in Table6 .

Table 6: Changes in the SPPB

Group	Item	Before rehabilitation	1 month after rehabilitation
CBT-PR	SPPB total points	6.33±1.05	10.07±1.03
	balanced capacity	1.93±0.80	3.43±0.63
	Walking speed	2.87±0.74	3.07±0.80
	Lower limb strength	1.53±0.52	3.60±0.51
PR	SPPB total points	6.33±1.11	10.93±1.03
	balanced capacity	1.93±0.88	2.20±0.68
	Walking speed	2.87±0.64	3.33±0.82
	Lower limb strength	1.53±0.52	3.40±0.63

5.2.4 Changes in the weekly exercise volume

1）IPAQ scores were significantly increased in both groups before and after rehabilitation training (P < 0.01).

2） There was no statistical difference between the two patient IPAQ scores after rehabilitation training (P> 0.05).

3）The CBT-PR group showed a significant improvement over the conventional PR group, with statistics Differdifference (P <0.01) are shown in Table 7.

Table 7: Changes in the weekly exercise volume

Group	Item	Before rehabilitation	1 month after rehabilitation
CBT-PR	IPAQ	3731.13±187.78	8565.53±257.10
PR	IPAQ	3808.20±111.86	8563.00±262.33

5.2.5 Changes in the quality of life

1） Total SGRQ scores before and after rehabilitation training showed significant changes in symptom restriction and movement restriction Good, with a statistical difference (P <0.05). No statistical difference in disease impact score (P> 0.05).

2） There was no statistical difference between the two groups in the SGRQ scores after rehabilitation training (P> 0.05).

3) CBT-PR group significantly improved SGRQ total score compared with conventional PR group, symptom restriction and

movement restriction, and score time group (P <0.01), as shown in Table 8.

Table 8: Changes in the quality of life

Group	Item	Before rehabilitation	1 month after rehabilitation
CBT-PR	SGRQ total points	54.34±17.01	47.57±13.11
	Symptoms limit	53.94±19.71	49.83±17.32
	limitation of movement	62.05±17.55	53.31±12.38
	Disease effects	46.33±18.85	46.19±18.80
Regular PR group	SGRQ total points	50.44±14.75	45.08±12.42
	Symptoms limit	48.11±17.74	47.31±17.59
	limitation of movement	63.16±15.03	56.19±11.14
	Disease effects	48.50±14.86	45.38±14.82

5.2.6 Changes in lung function

1) Expected value of FVC%, FEV 1%%, FEV 1 / FVC (%) before and after rehabilitation training in both groups There was no statistical difference (P> 0.05).

2) No expected FVC%, FEV 1%%, and FEV 1 / FVC (%) were found after rehabilitation training Statistical difference (P> 0.05).

3) FVC% of the SGRQ total score, symptom limitation and motor restriction scores compared with the control group No predicted, FEV 1% predicted, FEV 1 / FV C (%) (P> 0.05) as detailed in Table 9.

Table 9: Changes in lung function

Group	Item	Before rehabilitation	1 month after rehabilitation
CBT-PR	FVC% price	64.49±12.24	66.48±10.35
	FEV1% price	49.11±8.56	48.68±9.37
	FEV1/FVC(%)	44.37±10.16	50.16±9.44
Routine PR group	FVC% price	68.17±8.14	71.61±9.13
	FEV1% price	44.46±11.95	44.93±13.33
	FEV1/FVC(%)	51.29±9.72	51.07±7.51

5.2.7 Changes in the stages of regular motor behavior change

At 1 month, 11 people in the CBT-PR group entered the action period, representing 73.33% of the total number in the CBT-PR group, Two people in the conventional PR group entered the action period, and 13.33% of the total number in the conventional PR group, but still had 7 people (46%) were in the motivation period (without any motor behavior), and the two groups were statistically different.

Table 10: Changes in the changing phase of regular motor behavior

Item		CBT-PR group	Conventional PR group	
		n (%)	n (%)	P
15 Days		15	15	0.00
	Motivation period	0 (0%)	7 (46.67%)	
	preparation period	4 (26.67%)	6 (40%)	
	Action period	11 (73.33%)	2 (13.33%)	
30 Days		15	15	0.00
	Motivation period	1 (6.67%)	12 (80%)	
	preparation period	3 (20%)	1 (6.67%)	
	Action period	8 (53.33%)	2 (13.33%)	
	Maintenance period	3 (20%)	0 (0%)	

6 Analytic study

6.1 COPD Exercise rehabilitation status of the patient

COPD patients have poor awareness and low prevalence of exercise. This study found that most of the 30 COPD patients surveyed lacked exercise awareness, had no understanding of the impact of exercise on their condition, and did not know how to engage in scientific exercise methods. Over 71.33% of the patients did not engage in any form of exercise, primarily due to a lack of exercise awareness (82.24%), followed by symptoms such as breathlessness and coughing limiting their ability to exercise (10.28%). Additionally, we found that demographic factors such as education level, gender, and age had little influence on whether or not they exercised. Among those who engaged in physical activity, the majority did not meet regular exercise levels; the main factor being insufficient intensity (100%) with a subjective perception that exercising was easy. There was also a misunderstanding regarding the forms of exercises with many patients believing that "abdominal breathing" or "lip pursing breathing" constituted complete pulmonary rehabilitation while having limited knowledge about regular aerobic exercises' significance. Furthermore, there was generally poor awareness among COPD patients regarding monitoring during physical activity; very few wore devices for monitoring oxygen saturation levels during exercises.

6.2 COPD Rehabilitation awareness of COPD patients and the reasons for hindering rehabilitation training

In terms of rehabilitation awareness, more than half of the patients were aware of pulmonary rehabilitation (54%), but only 2 were in progress

Lung rehabilitation training in professional institutions (1.33%). The cost problem is the main reason to hinder the rehabilitation training of patients, taking the rehabilitation department of the Affiliated Hospital of Chengdu University of Traditional Chinese Medicine as an example, the cost of a rehabilitation is about 200-300 yuan, calculated once a day, 5 times a week, the monthly rehabilitation cost is about 4000-6000 yuan. With reference to the upper limit of 20,000 yuan reimbursement for medical insurance clinics in Chengdu, rehabilitation costs

cannot be fully covered. In addition, the distance of professional rehabilitation institutions from their homes and patients' acceptance of rehabilitation training are also factors that affect patients' participation in rehabilitation training.

6.3 COPD Quiet and solid life pattern of COPD patients

In this study, it was found that 28.67% of the 30 COPD patients had exercise behavior, which was lower than that in foreign studies. The reason may be related to the late start of pulmonary rehabilitation in China, the lack of publicity and education, and the low popularization of pulmonary rehabilitation knowledge. A study on physical activity and length of hospital stay in COPD patients （KATAJISTO M, LAITINEN T.International journal of chronic obstructive pulmonary disease, 2017） showed that a sedentary lifestyle is an independent risk factor for acute onset and re-hospitalization in COPD patients, and it was suggested that if COPD patients maintained regular exercise, the length of hospital stay could be reduced by 57% per year. Most of the subjects in this study adopt static lifestyle. How to safely and effectively improve the activity level of COPD patients and break the static lifestyle is a difficult problem in front of us, which needs to be further studied and solved by pulmonary rehabilitation workers.

6.4 Effect of CBT on regular motor behavior and rehabilitation effects

6.4.1 Effect of CBT on regular motor behavior

After 1 months, 11 patients (73.33%) in the CBT-PR group progressed to the action stage, while 13 patients (86.67%) in the conventional PR group remained in the motivation stage and the preparation stage, with significant difference between the two groups ($p < 0.01$). After 1 months, 3 (20%) of the CBT-PR group entered the maintenance phase, most of them were in the action phase (53.33%), while 13 (86.67%) of the conventional PR group stayed in the motivation phase and the preparation phase, with significant difference between the two groups ($p < 0.01$). The results showed that the regular exercise behavior of CBT-PR group was significantly increased after CBT intervention than that of conventional PR group. CBT treats each client as a unique individual and, based on his or her life experience, worldview and problems, changes his or her cognition and behavior to achieve therapeutic purposes（TAI S, TURKINGTON D.Schizophrenia bulletin）.

6.4.2 Effect of CBT on rehabilitation effects

CBT had a significant effect on the rehabilitation of COPD patients. The results showed that 61 months after the training, the CBT-PR group had time-group differences in exercise ability, weekly amount of exercise and quality of life compared with the conventional PR group ($p < 0.01$). It shows that CBT has better long-term rehabilitation effect in patients with severe and extremely severe COPD.

7 Final conclusion

Few COPD patients keep regular exercise, most of them adopt the static and solid life mode, and the penetration rate of pulmonary rehabilitation is not high, so it is difficult to conduct continuous rehabilitation training.

Pulmonary rehabilitation is safe and effective for patients with severe and extremely severe COPD. The CBT intervention can improve the exercise capacity and quality of life, and improve the lung function. The pulmonary rehabilitation program with CBT as the core has better long-term effect than the conventional pulmonary rehabilitation program.

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