

심폐재활

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

## **P 1-65**

### **The effect of pulmonary rehabilitation on respiratory muscle strength and factors to affect it**

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#### **Objective**

The importance of pulmonary rehabilitation (PR) in chronic obstructive pulmonary disease (COPD) patients has already been demonstrated. It is known that COPD affects the weakness of inspiratory muscle and patients with muscle weakness are suggested to proceed with PR including inspiratory muscle training. The purpose of this study was to evaluate the change in respiratory muscle strength of COPD patients who underwent PR for more than 2 months, and to investigate factors to affect the effectiveness of rehabilitation.

#### **Method**

A retrospective review was conducted on COPD patients from January 2015 to May 2019. Patients who had 2 month hospital based PR or home based PR with initial education session in a tertiary university hospital were included. They were referred to outpatient department of rehabilitation medicine after hospital discharge, or were continuously followed up through outpatient clinic. PR program consisted of aerobic exercise, resistance exercise, breathing retraining, and secretion management. Inspiratory muscle training was performed if necessary. The evaluation values include modified medical research council dyspnea scale (mMRC), CAT score, pulmonary function test results, maximal inspiratory pressure (MIP), and maximal expiratory pressure (MEP) recorded before and after the PR.

#### **Results**

The results of the evaluation values of all patients were described in table 1. The mMRC, CAT score, MEP, and MEP% showed a significant improvement after 2 month PR. The results of patients who started PR within one month after acute exacerbation (AE) and who had stable outpatient clinic follow-up is described in table 2. While MIP, MIP%, MEP, MEP%, FEV1, FEV1%, and FEV1/FVC were found to be increased significantly in AE group, the mMRC, MEP, and MEP% showed improvement in stable group. When comparing the changes in evaluation values after the PR between the two groups, the improvement in

FEV1, FEV1% and PCF were greater in the AE group than in the stable group. Table 3 shows the results of groups that consistently performed PR in hospital and groups that performed home exercise with initial education session. In hospital PR group, significant improvement was observed in mMRC, CAT score, MIP, MIP%, MEP, and MEP%, whereas only FEV1% is increased significantly in home-based exercise group. When comparing the changes in evaluation values between the two groups, the change in MIP and MIP% were greater in the hospital PR group than in the home-based exercise group.

## Conclusion

There was improvement in the assessment about clinical symptom (mMRC, CAT score) after PR, but without respiratory muscle specific training, no significant change were seen in MIP. Meanwhile, PR under the guidance and supervision of therapists at hospital has had a significant impact on the improvement of respiratory muscle strength. We also found that PR after AE of COPD influenced the improvement of respiratory muscle strength as well as other values.

Table 1. Parameters of pre- and post-pulmonary rehabilitation of COPD patients

Evaluation value	Pre	Post	$\Delta$	p
mMRC (n=44)	2.66 ( $\pm$ 1.14)	2.32 ( $\pm$ 1.20)	-0.34	0.02*
CAT (n=43)	16.65 ( $\pm$ 7.20)	14.63 ( $\pm$ 6.85)	-2.02	0.02*
MIP (n=46)	67.43 ( $\pm$ 30.05)	70.50 ( $\pm$ 27.27)	3.07	0.33
MIP% (n=46)	95.18 ( $\pm$ 38.41)	100.23 ( $\pm$ 35.37)	5.05	0.27
MEP (n=46)	95.22 ( $\pm$ 35.06)	106.28 ( $\pm$ 36.75)	11.06	<0.001*
MEP% (n=46)	84.02 ( $\pm$ 31.63)	93.9 ( $\pm$ 32.00)	9.88	<0.001*
PCF (n=46)	312.85 ( $\pm$ 160.58)	284.55 ( $\pm$ 118.56)	-28.30	0.38
FEV1 (n=43)	1.09 ( $\pm$ 0.40)	1.13 ( $\pm$ 0.44)	0.04	0.33
FEV1% (n=43)	45.14 ( $\pm$ 17.13)	47.49 ( $\pm$ 19.25)	2.35	0.12
FEV1/FVC (n=43)	51.58 ( $\pm$ 14.53)	52.6 ( $\pm$ 14.24)	1.02	0.12

$\Delta$  means (post - pre) values.

\*means statistical significance.

Table 2. Comparison of parameters of pre- and post-pulmonary rehabilitation between acute exacerbation of COPD and stable COPD

Evaluation value	Acute exacerbation				Evaluation value	Stable				p <sup>†</sup>
	Pre	Post	Δ	p		Pre	Post	Δ	p	
m M R C (n=15)	2.60 (± 1.24)	2.20 (± 1.21)	-0.40	0.256	m M R C (n=29)	2.69 (± 1.11)	2.38 (± 1.21)	-0.31	0.039*	0.685
CAT (n=14)	15.71 (± 6.46)	11.93 (± 7.72)	-3.78	0.026*	CAT (n=29)	17.10 (± 7.10)	15.93 (± 6.69)	-1.17	0.259	0.154
MIP (n=16)	62.56 (± 33.29)	69.50 (± 36.56)	6.94	<0.001*	MIP (n=30)	70.03 (± 28.43)	71.03 (± 21.50)	1.00	0.805	0.372
M I P % (n=16)	88.97 (± 43.91)	99.75 (± 50.03)	10.78	0.001*	M I P % (n=30)	98.49 (± 35.49)	100.48 (± 25.42)	1.99	0.734	0.365
MEP (n=16)	95.31 (± 38.64)	104.13 (± 37.27)	8.82	0.001*	MEP (n=30)	95.17 (± 33.69)	107.43 (± 37.05)	12.26	0.001*	0.611
M E P % (n=16)	82.25 (± 32.66)	89.48 (± 32.29)	7.23	0.001*	M E P % (n=30)	84.97 (± 31.60)	96.26 (± 32.14)	11.29	0.001*	0.497
PCF (n=16)	275.63 (± 160.83)	285.31 (± 98.55)	9.68	0.157	PCF (n=30)	332.70 (± 159.56)	284.14 (± 129.57)	-48.56	0.046	0.029*
FEV1 (n=14)	1.05 (± 0.30)	1.22 (± 0.42)	0.17	<0.001*	FEV1 (n=29)	1.11 (± 0.44)	1.09 (± 0.46)	-0.02	0.346	0.013*
F E V 1 % (n=14)	45.64 (± 13.47)	54.00 (± 19.30)	8.36	<0.001*	F E V 1 % (n=29)	44.90 (± 18.86)	44.34 (± 18.74)	-0.56	0.346	0.004*
FEV1/FVC (n=14)	50.64 (± 9.94)	52.29 (± 10.67)	1.65	<0.001*	FEV1/FV C (n=29)	52.03 (± 16.44)	52.76 (± 15.85)	0.73	0.417	0.515

Δ means (post – pre) values.

p<sup>†</sup>: for comparison between two groups

\*means statistical significance.

Table 3. Comparison of parameters of pre- and post-pulmonary rehabilitation between Hospital-based pulmonary rehabilitation group and Home-based exercise group

Evaluation value	Hospital PR				Evaluation value	Home-based exercise				p <sup>†</sup>
	Pre	Post	Δ	p		Pre	Post	Δ	p	
m M R C (n=27)	2.56 (± 1.22)	2.00 (± 1.27)	-0.56	0.007*	m M R C (n=17)	2.82 (± 1.02)	2.82 (± 0.88)	0.00	0.86	0.109
CAT (n=27)	15.04 (± 7.37)	12.41 (± 7.23)	-2.63	0.041*	CAT (n=16)	19.38 (± 4.98)	18.38 (± 5.54)	-1.00	0.35	0.363
MIP (n=27)	70.59 (± 32.13)	79.00 (± 29.10)	8.41	0.028*	MIP (n=19)	62.95 (± 27.03)	58.42 (± 19.35)	-4.53	0.39	0.040*
M I P % (n=27)	99.79 (± 39.57)	112.46 (± 36.43)	12.67	0.026*	MIP% (n=19)	88.62 (± 36.74)	82.85 (± 25.83)	-5.77	0.45	0.045*
MEP (n=27)	101.33 (± 40.54)	115.85 (± 41.59)	14.52	0.004*	MEP (n=19)	86.53 (± 23.73)	92.68 (± 23.34)	-6.15	0.12	0.199
M E P % (n=27)	89.35 (± 35.33)	101.68 (± 36.03)	12.33	0.005*	M E P % (n=19)	76.45 (± 24.39)	82.85 (± 21.57)	6.40	0.08	0.303
PCF (n=27)	356.15 (± 182.72)	300.56 (± 117.12)	-55.59	0.097	PCF (n=19)	251.32 (± 97.11)	261.80 (± 119.99)	10.48	0.50	0.096
FEV1 (n=26)	1.13 (± 0.36)	1.13 (± 0.35)	0.00	0.980	FEV1 (n=17)	1.02 (± 0.45)	1.12 (± 0.57)	0.10	0.08	0.183
F E V 1 % (n=26)	46.46 (± 16.72)	47.31 (± 16.98)	0.85	0.680	F E V 1 % (n=17)	43.12 (± 18.05)	47.76 (± 22.84)	4.64	0.03*	0.213
FEV1/FV C (n=26)	49.96 (± 10.90)	50.42 (± 11.20)	0.46	0.523	FEV1/FV C (n=17)	54.06 (± 18.91)	55.94 (± 17.79)	1.88	0.15	0.292

Δ means (post – pre) values.

p<sup>†</sup>: for comparison between two groups

\*means statistical significance.