



Original Article

The effects a respiration rehabilitation program on IADL, satisfaction with leisure, and quality of sleep of patients with chronic obstructive pulmonary disease

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Abstract. [Purpose] This study was designed to determine the effect of a respiration rehabilitation program on daily activities, satisfaction with leisure, and quality of sleep of patients with chronic obstructive pulmonary disease. [Subjects and Methods] The program was conducted three times a week for 12 weeks (a total of 36 times) with 20 patients aged between 50 and 70 years old. The Frenchay Activity Index was used to determine the instrumental activities of daily living before and after the intervention. The Korean scale of satisfaction with leisure was employed to determine the satisfaction with leisure, and the Korean version of the Pittsburgh Sleep Quality Index was used to measure the quality of sleep. [Results] The total score of all three instruments (instrumental activities of daily living (IADL), satisfaction with leisure, and quality of sleep) improved significantly after the intervention. [Conclusion] In conclusion, the scores of all three instruments (IADL, satisfaction with leisure, and quality of sleep) improved significantly after the intervention, indicating that the respiration rehabilitation program was effective at improving the overall quality of life for patients with chronic obstructive pulmonary disease.

Key words: COPD, IADL, Satisfaction with leisure

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) refers to an irreversible progressive disease that occurs due to damage in the alveolar duct wall and inflammation in the respiratory tract¹⁾. COPD may become the third leading cause of death worldwide by 2020²⁾. Owing to the characteristics of the disease, COPD cannot be cured completely. Consequently, the disease can affect normal daily life and functional conditions, thereby imposing an adverse effect on daily activities. Patients with COPD experience degradation of basic daily activities as a result of respiration symptoms (e.g., shortness of breath, cough, and sputum), general symptoms (e.g., fatigue, sleep disorders, and memory loss), as well as psychological problems (e.g., depression due to deterioration of functional status)³⁻⁵⁾. Thus, it is necessary for patients with COPD to have a treatment plan that maintains independence of physical and social functional performance while alleviating symptoms such as shortness of breath (one of the main symptoms of COPD), and increases participation in daily activities to prevent degradation of independence⁵⁾. Medication and non-pharmacologic therapy including respiration rehabilitation interventions, have been used to treat patients with COPD⁶⁾.

A respiration rehabilitation program is a client-oriented custom-made program for patients and guardians. It is executed in accordance with client conditions and administered using an interdisciplinary approach in order to enhance quality of life,

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reduce depression, increase participation in daily activities through respiration function recovery, increase respiration muscle strength, and mitigate shortness of breath⁶⁻⁹). Previous studies have shown that most respiration rehabilitation programs for patients with COPD improved the quality of life and strength of respiration muscles⁶⁻⁸), but few studies^{15, 19}) have been conducted to determine the impact of the disease on sleep quality (which is one of the main symptoms associated with shortness of breath and/or coughing), instrumental activities of daily living, or satisfaction with leisure, which are important indices for rehabilitation. Thus, this study aimed to determine the effect of a respiration rehabilitation program on quality of sleeping, instrumental activities of daily living, and satisfaction of leisure among patients with COPD.

SUBJECTS AND METHODS

This study was approved by the Institutional Review Board of Kaya University (Kaya IRB-117). Subjects participated in this study after receiving an explanation of the purpose of the study and provided their written consent, in accordance with the ethical principles of the Declaration of Helsinki, good clinical practices, and applicable laws and regulations. The subjects recruited for this study were 20 outpatients (16 males and 4 females) aged between 50 and 70 years, who visited two general hospitals in Seoul and were diagnosed as having COPD by respiration specialists at the hospitals. The mean age, height, and weight of the subjects were 60.2 ± 4.7 years, 166.0 ± 7.7 cm, and 60.2 ± 4.7 kg, respectively. Their measured body mass index (BMI) was 22.0 ± 2.7 , forced expiratory volume in the first second (FEV1) was 61.4 ± 6.0 l, and forced expiratory volume in 1 s as a percentage of predicted (%FEV1) was 55.6 ± 6.3 . Their scores on the Medical Research Council (MRC) scale (for measuring breathing difficulty) was 2.4 ± 0.7 , and their metabolic equivalents (METs) were estimated as 3.6 ± 0.9 (Table 1).

Subjects were given one or more medications to treat COPD, resulting in stabilization of their condition without severe problems. The respiration rehabilitation program was conducted for 50 minutes per session, three times a week, for 12 weeks, according to the Respiration Rehabilitation Instructions of Korea⁹). Based on the patients' conditions, the respiration rehabilitation program included breathing training, expectoration, aerobic exercise (20 mins), muscle strengthening of upper and lower extremities (10 mins), strengthening of the respiration muscles (10 mins), daily life training, and energy preservation. Subjects were required to provide voluntary written consent in order to participate in this study. To determine the effect of the therapeutic intervention, instrumental activities of daily living were assessed using the Frenchay Activity Index (FAI)¹⁰). Satisfaction with leisure was determined through the leisure satisfaction scale, which was originally developed by Beard and Raghed¹¹) and later developed and validated as the Korean leisure satisfaction scale by Kim¹²). Determination of the quality of sleep was based on the Korean version of the Pittsburgh Sleep Quality Index (PSQI-K)¹³), which was a Korean version of based on the Pittsburgh Sleep Quality Index (PSQI)¹⁴). The PSQI was originally developed by Buysse et al.¹⁴), and later translated and validated by Sohn et al.¹³) as a reliable measure of the quality of sleep. All the measurements, including the general questions and answers provided by the subjects, were scored and statistically analyzed using the SPSS/WIN statistical program 21.0. The general characteristics of the subjects were determined using descriptive statistics. The paired sample t-test was conducted to determine whether the respiration rehabilitation program was effective at improving satisfaction with leisure, and instrumental activities of daily living after the program intervention. Statistical significance was accepted for values of $p < 0.05$.

Table 1. The general characteristics of the subjects (N=20)

Categories	Items	Mean \pm SD
Gender	male	16 ^a (80.0) ^b
	female	4 ^a (20.0) ^b
Ages (yrs)		61.0 \pm 5.1
Height (cm)		166.0 \pm 7.7
Weight (kg)		60.2 \pm 4.7
BMI (kg/m ²)		22.0 \pm 2.7
%FEV _{1.0} (%)		61.4 \pm 6.0
%FEV _{1.0} /FVC (%)		55.6 \pm 6.3
MRC scale		2.4 \pm 0.7
METs		3.6 \pm 0.9

^a number of subjects, ^b% of subjects

RESULTS

With respect to differences in instrumental activities of daily living (IADL), subjects showed overall statistically significant improvements in all activities after the intervention ($p < 0.05$). Specifically, completion of domestic chores increased from 8.3 ± 0.8 to 9.1 ± 0.9 after the intervention; leisure increased from 6.5 ± 0.5 to 9.6 ± 1.8 after the intervention, and outdoor activity increased from 6.4 ± 0.5 to 8.4 ± 2.7 . The total score increased from 21.2 ± 1.5 to 27.0 ± 4.1 , which was statistically significant (Table 2).

The score for satisfaction with leisure increased in the aesthetic and social areas after the intervention, but the differences were not statistically significant. On the other hand, the total score for quality of sleep decreased from 8.5 ± 0.6 before the intervention, to 6.7 ± 1.1 after the intervention, indicating that the quality of sleep was improved the intervention (Table 2).

DISCUSSION

This study was a pre- and post-intervention evaluation of the benefits of a respiration rehabilitation program, which was conducted three times a week for 12 weeks. The purpose of this study was to determine the effect of the program on instrumental activities of daily living, satisfaction with leisure, and quality of sleep of patients with COPD. The goal was to generate basic data that can be utilized in clinics to improve the benefits of respiration rehabilitation programs for patients with respiration diseases in the future.

Patients with COPD experience adverse impacts on daily activities such as social participation, mainly due to respiration insufficiency. Measurements of instrumental activities of daily living showed that subjects had higher scores of instrumental activities such as household duties, leisure, and outdoor activities after the intervention than before the intervention. These results are consistent with a study by Xiang et al.¹⁵⁾, who reported that patients with COPD who participated a respiration rehabilitation program (including medical and psychological interventions) improved their instrumental activities of daily living in areas such as telephone use, shopping, public facility use, and financial management. Our results are also consistent with those of a previous study by Merida et al.¹⁶⁾, who reported that 25 patients with COPD who participated in a respiration rehabilitation program involving daily living exercise for 4 weeks, to improve respiration functions, showed improvements in their scores for instrumental activities of daily living after the intervention.

Respiration rehabilitation programs for patients with COPD can also increase satisfaction with leisure. A recent study found that an experimental group of 12 patients with COPD (aged 66 years or older), who participated in a 12-week multidisciplinary rehabilitation program involving exercise, nutrition, and self-management and training, showed a greater improvement in their satisfaction with leisure (using functional satisfaction) than an age-matched control group who did not participate in the program (from $4.6 (\pm 2.2)$ to $6.0 (\pm 2.1)$ scores, $p < 0.001$)¹⁷⁾. In a study by Walker et al.¹⁸⁾, an experimental group of 23 patients with COPD and an age-matched control group of 18 patients participated in a respiration rehabilitation program involving lower extremity movements for 3 days, and the authors found that there was a weak correlation between lower extremity movements and satisfaction with leisure, and that satisfaction with leisure (evaluated using the Nottingham Extended Activities of Daily Living Questionnaire) significantly improved after the intervention from 16.4 to 18.2 scores, $p < 0.001$. This result suggests that satisfaction with leisure is not significantly correlated with lower extremity movements such as walking although the improvement with lower extremity function had a significant effect with satisfaction with

Table 2. Comparison of the pre- and post-test values of IADL, satisfaction with leisure, and sleep quality

Categories		Pre-test ^a	Post-test ^a
IADL	Domestic chores	8.3 ± 0.8	$9.1 \pm 0.9^*$
	Leisure/work	6.5 ± 0.5	$9.6 \pm 1.8^{**}$
	Outdoor activities	6.4 ± 0.5	$8.4 \pm 2.7^*$
	Total	21.2 ± 1.5	$27.0 \pm 4.1^{**}$
Leisure satisfaction	Psychological	2.1 ± 0.7	$2.7 \pm 0.7^*$
	Relaxation	2.1 ± 0.7	$2.5 \pm 0.6^*$
	Aesthetic	2.3 ± 0.9	2.6 ± 0.7
	Social	2.4 ± 0.8	2.5 ± 0.8
	Educational	2.5 ± 1.0	$2.8 \pm 0.9^*$
Sleep quality	Physiological	2.7 ± 1.1	$3.0 \pm 0.9^*$
	Total	14.1 ± 4.2	$15.9 \pm 3.3^*$
	Total	8.5 ± 0.6	$6.7 \pm 1.1^{**}$

* $p < 0.05$, ** $p < 0.001$ ^aMean \pm SD

IADL: instrumental activities of daily living

leisure, consistent with our finding that an exercise program involving upper and lower extremities positively affected satisfaction with leisure.

Furthermore, the conducting a respiration rehabilitation program for patients with COPD can improve their quality of sleep that is otherwise adversely affected by difficulty with breathing. McDonnell et al.¹⁹⁾ reported that after patients with COPD had participated in a respiration rehabilitation program for 8 weeks, their score for quality of sleep declined reduced to below the baseline, but the PSQI index did not decrease to 5 points or less, implying that the program did not positively influence the quality of sleep. Soler et al.²⁰⁾ reported that for 46 patients with COPD who participated in a respiration rehabilitation program, the total score for quality of sleep declined but not to 5 points or less, which would have indicated a good quality of sleep. Nonetheless, the results of the Soler et al. study²⁰⁾ are consistent with those of the present study, in which the score for quality of sleep had declined after the respiration rehabilitation program had been conducted, although the reduction in the score did not translate into an improvement in quality of sleep. It is worth noting, however, that while the present study had a 1.8-point reduction in the quality of sleep score, McDonnell et al.¹⁹⁾ reported a 0.79-point reduction in the experimental group, whereas Soler et al.²⁰⁾ reported a 1.1-point reduction in the score for quality of sleep. Interestingly, the studies both McDonnell et al.¹⁹⁾ and Soler et al.²⁰⁾ had intervention periods of 8 weeks (in contrast to 12 weeks in the present study), which might explain the smaller reduction in the score. Thus, it may be necessary to conduct a long-term intervention in order to achieve a more positive effect of the respiration rehabilitation program on quality of sleep.

The results of the present study show that a respiration rehabilitation intervention was effective for improving instrumental activities of daily living, satisfaction with leisure, and quality of sleep. Therefore, based on our findings, it is our opinion that future research should be dedicated to the creation of facilities where the psychological and social health of patients with respiration diseases are promoted, and where respiration rehabilitation programs can be continuously performed tailored to of individual demands and activity levels within families and society as a whole.

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