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# The Effect of Progressive Relaxation Exercises on Dyspnea and Anxiety Levels in Individuals With COPD

## A Randomized Controlled Trial

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Dyspnea is a common symptom and anxiety is a common comorbidity of chronic obstructive pulmonary disease (COPD). They affect individuals with COPD in a multifaceted way, causing many disabilities. Progressive relaxation exercises (PREs) are an important intervention in reducing symptoms and comorbidity. The aim of this study was to determine the effects of PREs on dyspnea and anxiety levels in individuals with COPD. A pretest-posttest randomized controlled trial was conducted at the chest diseases clinic of a university hospital in Turkey. Forty-four patients with COPD who met the inclusion criteria for participation in the study were assigned either to an intervention or a control group, with 22 patients in each group. In the intervention group, the patients performed PREs once a day for 4 weeks in addition to the standard treatment. The patients in the control group received the standard treatment. In the data collection stage of the study, questionnaire forms, namely, the Modified Borg Scale (MBS), Modified British Medical Research Council Dyspnea Scale, COPD Assessment Test (CAT), and Beck Anxiety Inventory (BAI), were used. Data were collected before (the first follow-up) and after the intervention (the second follow-up). In the second follow-up, the MBS, BAI, and CAT scores decreased significantly in the intervention group ($P < .05$) but showed no significant changes in the control group ($P > .05$). This study demonstrates that PREs can reduce dyspnea and anxiety levels in individuals with COPD. **KEY WORDS:** *anxiety*, *COPD*, *dyspnea*, *nursing*, *progressive relaxation exercise* *Holist Nurs Pract* 2023;37(1):E14–E23

Chronic obstructive pulmonary disease (COPD) is a major health problem causing morbidity and mortality all over the world.[1] Dyspnea and anxiety, which are among the serious symptoms and comorbidities of COPD, are frequently seen and affect the individuals in a multifaceted way, causing many disabilities.[2,3] A study conducted in Latin American countries reported that dyspnea is the most common symptom during the day in 75% of individuals with COPD.[4] Patients experience intense fear due to dyspnea, inadequacies in the activities of daily life, changed priorities, increased dependence, fear of death, and intense anxiety and depression.[5,6]

Anxiety, which is frequent in individuals with COPD, is defined as the apprehensive anticipation of danger or stressful situations associated with an excessive feeling of dysphoria or somatic symptoms of tension.[6] A study by Bratek et al[7] reported the prevalence of anxiety as 42% of individuals with

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The authors declare that there is no conflict of interest.

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COPD. Anxiety is generally associated with dyspnea in individuals with chronic respiratory disease and is often considered a component of dyspnea.[6] The definition of anxiety by COPD patients as a sign of the exacerbation of the disease indicates a relationship between dyspnea and anxiety.[8,9]

For effective COPD management, it is important to treat dyspnea and anxiety, which have many negative effects on patients. Many pharmacological methods are used to reduce these symptoms, but nonpharmacological interventions are often forgotten despite their beneficial impact on those with COPD.[10] At present, the use of treatments based on body-soul and mental integrity is gaining importance in the management of dyspnea and anxiety. These interventions are recommended especially for severe diseases that are accompanied by complications such as function loss, decrease in quality of life, and psychological disorders.[11]

One of the integrated health interventions employed in COPD management is progressive relaxation exercises (PREs),[12] which involves the voluntary, regular, and consecutive relaxation of the muscles until relaxation is experienced all over the body.[13] The purpose of this treatment is to feel the difference between tension and relaxation in the body and to teach individuals to relax on their own in everyday life.[14] PREs reduce the heart and respiratory rates, oxygen consumption, and muscle tension, and ensure that the individual remains balanced in spite of the negative impacts of physical and psychological stress.[15] In a systematic review, it was demonstrated that relaxation exercises have a positive effect on psychological well-being and respiratory functions in COPD.[16] A study by Naveen Jebakumar et al[17] found that progressive relaxation applied twice a day for 5 days reduced blood pressure, heart rate, peak expiratory flow rate (PEFR), and anxiety. In a meta-analysis conducted to determine the effects of relaxation exercises on anxiety, it was demonstrated that PREs are effective in managing anxiety in psychological and psychosomatic diseases.[18] However, limited studies have been conducted on the effects of PREs on dyspnea and anxiety management in COPD.[17,19,20] There are also no studies on the effect of PREs on the COPD Assessment Test (CAT) score, which clinically measures the effects of COPD on the deterioration in health conditions.

Nursing care of COPD patients involves all the steps, from disease prevention to end-of-life care. Nurses play an important role in pharmacological management and integrated health practices in dyspnea and anxiety, which are the most serious symptoms in COPD.[21] Knowledge of relaxation exercises of nurses is essential to provide holistic nursing care.[15] Determining the effect of PREs, which is one of the independent functions of nurses, on dyspnea and anxiety management in individuals with COPD and transferring this practice to the clinic in an evidence-based manner are important for nursing care. This study was conducted to determine the effects of PREs, applied to individuals with COPD once a day for 4 weeks, on dyspnea and anxiety levels.

## METHODS

### Trial design

This study consists of a pretest-posttest randomized controlled trial, designed to determine the effects of PREs on dyspnea and anxiety levels in individuals with COPD.

### Study settings

This study was conducted at a university, health practice and research center, the Chest Diseases Clinic, between November 15, 2016, and September 15, 2017.

### Sample size

The sample size for the study was calculated based on the literatüre.[22-24] The sample size was calculated with a type-1 error of 5%, a power of 80%, and 0.88 effect size, which meant that a minimum sample size of 17 patients per group was needed. Considering the possibility that there might be losses in patients, for this study, 30 individuals were contacted for the intervention group, and 26 individuals were contacted for the control group; a total of 56 patients were included. Five patients were excluded from the intervention group because they did not do the PREs regularly, 1 patient was excluded because of exacerbation on the 27th day of the study, 1 patient was excluded because of surgery on the 23rd day of the study, and 1 patient was excluded because the patient did not come for the follow-up at the end of the study; therefore, a total of 8 patients were excluded from the intervention group. In the control group, 1 patient was excluded from the study because of exacerbation on the 18th day of the study, and 3 patients were excluded because they did not come for the follow-ups. Consequently, the sample consisted of

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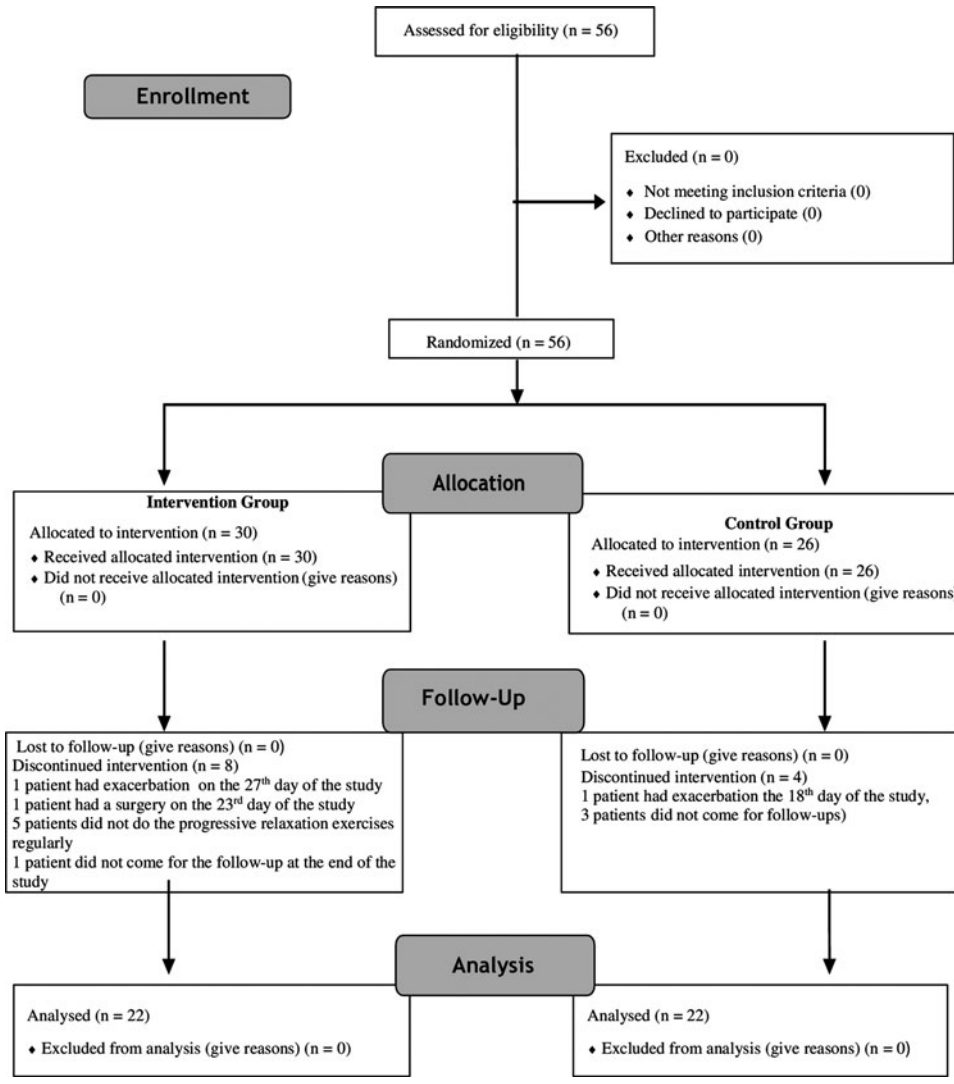



**FIGURE.** Consort flow diagram.

a total of 44 patients, 22 in the intervention group and 22 in the control group (Figure).

The power analysis was conducted using the G*Power 3.1.9.2 software program. The effect size and power analysis are presented in Table 3.

## Eligibility criteria for patients

The following eligibility criteria were determined for the study after receiving expert opinions and in the light of the literature data, as it was considered that the eligibility criteria could affect the results of the study.[16-18,25] Patients were eligible to be included in the study if they had cognitive competence to answer the questionnaire questions, could communicate verbally, were 18 years or older, were at the second or third stage of COPD according to the GOLD Guide staging system, had 2 or more severe dyspnea episodes according to the Medical Research Council (MRC) Dyspnea Scale, their medications had not been changed in the last 3 months, they had not received pulmonary rehabilitation in the last 6 months, and they were diagnosed with COPD at least 6 months before being included in the study. Individuals who had severe psychological disorders, who had non-COPD pulmonary diseases, who had prior exposure to PREs, and who had cancer, renal failure, thyroid dysfunction, or liver dysfunction were not included in the study. The study was discontinued for patients who started pulmonary rehabilitation, whose standard treatments, drugs, and doses of drugs were changed for COPD management (especially inhaler treatments), who used other integrated health practices during the study period, who had exacerbation during

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the study, who were hospitalized for any reason during the study, and for those who wanted to leave the study. This study was registered with ClinicalTrials.gov (NCT04559503).

## Interventions

Training in PREs was provided to the patients and their families in the intervention group by the researcher; the researcher monitored whether the patients did the exercises correctly. The training was given in line with a CD prepared by the Turkish Psychologists Association as a 3-part guide to relaxation exercises. The first part of the CD includes the definition and purpose of the exercises, interventions to consider when doing the exercises, and a description of a 10-minute deep relaxation exercise. In the second 30-minute section, relaxation exercises are explained accompanied by the sound of streams and oral instructions. The last 30-minute section contains only relaxation music without instructions.

Before the application, the correct breathing technique was taught to the patients in the intervention group by explaining the importance of heavy, deep, and quiet breathing. In the study, each patient was given an MP3 player on which the PRE CD had been recorded, and was asked to perform the exercises according to the instructions on the CD. In addition, the patients were also given a guide developed by the researcher in line with the PRE CD and steps that were written for PREs for each muscle group.

The first meeting with individuals who have COPD and had agreed to participate in the study lasted 45 to 70 minutes. Patients were told to do the exercises regularly at home, in the morning, every day for a month. They were called 3 times each week (Monday, Wednesday, and Friday) on the telephone to monitor whether they continued to do the exercises. The MRC Dyspnea Scale, the Modified Borg Scale (MBS), the CAT, and the Beck Anxiety Inventory (BAI) were readministered after 4 weeks at the second follow-up of the patients. No interventions were made to the control group, and at the second follow-up 4 weeks after the first follow-up, the MRC Dyspnea Scale, the MBS, the CAT, and the BAI were readministered.

## Data collection

The study used simple randomization to determine the groups. In order for patients from the different groups not to encounter or be affected by one another, a day separation was made based on study inclusion: The study was conducted 1 day with the intervention group, and on another day with the control group. It was decided by lottery method, which group to start with initially, and as a result of this, work began with the control group first.

The data collection tools were applied to individuals with COPD who applied to the Chest Diseases Clinic by considering the criteria for inclusion and exclusion, after examination by a doctor. The study data were collected by the researcher during interviews, using the face-to-face interview technique in a separate room of the Chest Diseases Clinic.

The questionnaire form, the MRC Dyspnea Scale, the MBS, the CAT, and the BAI were administered to the individuals with COPD in the intervention and control groups at the first meeting. The MRC Dyspnea Scale, the MBS, the CAT, and the BAI were readministered after 4 weeks at the second follow-up of the patients.

## Outcome measures

The data of the study were collected using the questionnaire forms, the MBS, the MRC Dyspnea Scale, the CAT, and the BAI.

### *Questionnaire form*

The questionnaire contained a total of 20 questions, and was prepared by the researcher by making use of the literature[16-18] and incorporating expert opinions, to determine socio-demographic characteristics, the smoking status, and the disease status of the individuals with COPD.

### *Modified Borg Scale*

The Modified Borg Scale (MBS) was developed by Borg in 1970 to measure the effort that is expended during physical exercise.[26] It is a scale that is often used to assess exertion dyspnea severity and resting dyspnea severity. There are 10 items that define the severity of dyspnea, based on their scores between 0 and 10. A score of 0 indicates no dyspnea, and a score of 10 indicates very severe dyspnea.[27]

### *Medical Research Council Dyspnea Scale*

Fletcher et al developed the Medical Research Council (MRC) Dyspnea Scale in the 1940s when they worked on the respiratory problems of coal workers.[28] Subsequently, the British Medical Research Board further developed this scale and used

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it to monitor the natural course of COPD.[27] The MRC Dyspnea Scale is a 5-item scale (grade 0 to grade 4) based on various physical activities, which cause a degree of dyspnea. Patients are asked to mark the level of activity that causes dyspnea in them. Higher scores on the MRC Dyspnea Scale demonstrate that the perception of shortness of breath is more severe.[27,29]

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### *COPD Assessment Test*

This test was developed by Jones et al[30] in 2009. The Turkish reliability and validity of the test were verified by Yorgancıoğlu et al in 2012.[31] It is an easy, short, 8-item scale that clinically measures the effects of COPD on deterioration in health conditions. The lowest score that can be achieved on the scale is 0, and the highest score is 40. Yorgancıoğlu et al calculated the Cronbach $\alpha$ coefficient of the scale as 0.91.[31] In our study, the Cronbach $\alpha$ coefficient of the scale was found to be 0.83 for the control group and 0.85 for the intervention group.

### *Beck Anxiety Inventory*

This scale, which can distinguish anxiety from depression, was developed by Beck et al.[32] The validity and reliability studies for the scale for Turkey were conducted by Ulusoy et al[33] in 1998. The scale measures the frequency of anxiety symptoms of individuals using self-evaluation. The inventory consists of 21 items and uses a 4-point Likert scale; the scores range between 0 and 63. Based on the scores achieved on the scale, the anxiety levels of patients are assessed as follows: 0 to 7 points: minimal, 8 to 15 points: mild, 16 to 25 points: moderate, 26 points and above: severe anxiety. The Cronbach $\alpha$ coefficient of the scale was calculated as 0.93 in a study conducted in Turkey.[33] In our study, the Cronbach $\alpha$ coefficient of this scale was found to be 0.87 for the control group and 0.75 for the intervention group.

## Data analysis

The data obtained in this study were analyzed using the Statistical Package for Social Sciences (SPSS) 24.0 for Windows. The normal distribution of data was evaluated using the Shapiro-Wilk normality test and Q-Q graphics. The summarized statistics of the variables are given as units (n), percentage (%), mean, $\bar{X}$, and standard deviation (SD). Chi-square and *t*-test statistics were used to evaluate the data. The reliability coefficient was calculated by performing a scale reliability test. A value of $P < .05$ was regarded as statistically significant.

### *Statement of ethics*

To conduct the study, approval was obtained from the Ethics Committee of Clinical Research of Erciyes University, Faculty of Medicine (2016/158). Institutional permission was also received from the Chest Diseases Department of Erciyes University, Health Practice and Research Center. Furthermore, verbal permissions were obtained from the patients who participated in the study, after explaining the procedures to them, and they also signed informed consent forms.

## RESULTS

The individuals with COPD in the intervention and control groups had similar descriptive (age, gender, marital status, education level, occupational status, income level, etc) and disease-related characteristics (stage, diagnosis duration, having chronic disease) ($P > .05$) (Tables 1 and 2).

The mean MBS score of the patients in the intervention group decreased from 3.91 ± 1.51 to 3.50 ± 1.63 by the second follow-up, and the difference between the 2 follow-ups was statistically significant ($P < .05$). The mean MBS score of the patients in the control group had increased by the second follow-up; however, the difference was not found to be statistically significant ($P > .05$). The mean MRC Dyspnea Scale score of patients in the intervention group decreased from 2.36 ± 0.49 at the first follow-up to 2.23 ± 0.69 at the second follow-up; the difference between the 2 scores was not found to be statistically significant ($P > .05$). It was found that the patients in the control group did not exhibit any changes ($P > .05$). The mean BAI score of the patients in the intervention group decreased from 23.81 ± 5.70 at the first follow-up to 13.55 ± 5.62 at the second follow-up; the difference between the 2 scores was found to be statistically significant ($P < .001$). The mean BAI score of the control group had increased by the second follow-up compared with the first follow-up; however, this difference was not found to be statistically significant ($P > .05$).

The mean CAT score of the patients in the intervention group decreased from 24.09 ± 6.93 at the first follow-up to 20.27 ± 7.73 at the second follow-up; the difference between the 2 scores was found to be statistically significant ($P < .001$).

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**TABLE 1.** Descriptive Characteristics of Patients With COPD

| Characteristics | Groups: Intervention (n = 22), n (%) | Groups: Control (n = 22), n (%) | Total, n (%) | *P* |
|---|---|---|---|---|
| Age group | | | | |
| 40-59 y | 6 (27.3) | 6 (27.3) | 12 (27.3) | .799 |
| 60-69 y | 12 (54.5) | 10 (45.4) | 22 (50.0) | |
| ≥70 y | 4 (18.2) | 6 (27.3) | 10 (22.7) | |
| Mean age ($\bar{X} \pm$ SD) | 63.23 ± 8.52 | 64.09 ± 8.04 | 63.65 ± 8.19 | .731 |
| Mean BMI ($\bar{X} \pm$ SD) | 25.36 ± 4.13 | 27.94 ± 5.37 | 26.65 ± 4.91 | .081 |
| Gender | | | | |
| Female | 4 (18.2) | 3 (13.6) | 7 (15.9) | .500 |
| Male | 18 (81.8) | 19 (86.4) | 37 (84.1) | |
| Educational status | | | | |
| Literate/Primary school | 13 (59.1) | 17 (77.3) | 30 (68.2) | .234 |
| High school | 6 (27.3) | 5 (22.7) | 11 (25.0) | |
| University | 3 (13.6) | 0 (0.0) | 3 (6.8) | |
| Marital status | | | | |
| Married | 20 (90.9) | 21 (95.5) | 41 (93.2) | .500 |
| Single | 2 (9.1) | 1 (4.5) | 3 (6.8) | |
| Income status, ($\bar{X} \pm$ SD) | | | | |
| Bad | 0 (0.0) | 2 (9.1) | 2 (4.6) | .607 |
| Moderate | 20 (90.9) | 19 (86.4) | 39 (88.6) | |
| Good | 2 (9.1) | 1 (4.5) | 3 (6.8) | |
| Profession | | | | |
| Retired | 15 (68.2) | 14 (63.7) | 29 (65.9) | .677 |
| House wife | 2 (9.1) | 3 (13.6) | 5 (11.4) | |
| Employee/Farmer | 5 (22.7) | 5 (22.7) | 10 (22.7) | |
| Having received training on the disease status | | | | |
| Yes | 2 (9.1) | 0 (0.0) | 2 (4.5) | .244 |
| No | 20 (90.9) | 22 (100.0) | 42 (95.5) | |
| Smoking status | | | | |
| Nonsmoker | 4 (18.2) | 3 (13.6) | 7 (15.9) | .832 |
| Quit | 14 (63.6) | 13 (59.1) | 27 (61.4) | |
| Smoking | 4 (18.2) | 6 (27.3) | 10 (22.7) | |
| Smoking duration, ($\bar{X} \pm$ SD), (year) | 34.28 ± 13.24 | 33.47 ± 9.13 | 33.86 ± 11.16 | .830 |
| Cigarette amount (package) ($\bar{X} \pm$ SD) | 1.28 ± 0.60 | 1.21 ± 0.51 | 1.24 ± 0.54 | .715 |
| Cigarette amount (package × year) ($\bar{X} \pm$ SD) | 45.97 ± 33.79 | 40.71 ± 27.61 | 43.27 ± 27.61 | .575 |

Abbreviation: BMI, body mass index.

It was found that the mean differences between the second follow-up scores and the first follow-up scores for individuals with COPD in the intervention and control groups, as measured by the MBS, the BAI, and the CAT, were statistically significant ($P < .001$).

The findings regarding the forced expiratory volume in 1 second ($FEV_1$) and the forced expiratory volume in 1 second/forced vital capacity ($FEV_1$/FVC) used in the spirometric classification of COPD, and evaluated as pulmonary function tests, are presented in Table 3. When the comparison between the second follow-up and the first follow-up of the groups was examined, it was found that the difference in the $FEV_1$ (%) values was statistically significant ($P < .05$) (Table 3).

## DISCUSSION

The present study aimed to determine the effect of PREs, applied once a day for 4 weeks, on the dyspnea and anxiety levels of individuals with COPD.

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**TABLE 2.** The Disease Characteristics of Patients With COPD

| Characteristics | Groups: Intervention (n = 22), n (%) | Groups: Control (n = 22), n (%) | Total n (%) | *P* |
|---|---|---|---|---|
| COPD stage | | | | |
| Second stage | 7 (31.8) | 9 (40.9) | 16 (36.4) | .552 |
| Third stage | 15 (68.2) | 13 (59.1) | 28 (63.6) | |
| COPD diagnosis duration, (year) | | | | |
| ($\bar{X} \pm$ SD) | 6.76 ± 5.95 | 7.09 ± 4.84 | 6.92 ± 5.36 | .842 |
| 2 | 2 (9.1) | 4 (18.2) | 6 (13.6) | |
| ≥3 | 2 (9.1) | 9 (40.9) | 11 (25.1) | |
| Having any chronic disease other than COPD | | | | |
| Yes | 7 (31.8) | 11 (50.0) | 18 (40.9) | .179 |
| No | 15 (68.2) | 11 (50.0) | 26 (59.1) | |
| Chronic diseases[a] | | | | |
| Diabetes mellitus | 3 (13.6) | 3 (13.6) | 6 (13.6) | |
| Hypertension | 3 (13.6) | 5 (22.7) | 8 (18.2) | .368 |
| Heart failure | 1 (4.5) | 4 (18.2) | 5 (11.4) | |

Abbreviation: COPD, chronic obstructive pulmonary disease.
[a]More than 1 answer was given.

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## The effect of PREs on dyspnea

It was found that, according to the MBS score, a significant improvement was observed in dyspnea levels at the second follow-up for patients in the intervention group. A study conducted by Kütmeç Yılmaz and Kapucu[34] found that PREs done with individuals with COPD for 8 weeks were effective in reducing dyspnea. In a study conducted by Renfroe,[19] PREs were done with individuals with COPD for 4 weeks, and dyspnea levels had decreased by significant levels after 4 weeks. Naveen Jebakumar et al[17] applied PREs to individuals with COPD twice a day for 5 days. As a result of this exercise, the mean MBS score of the intervention group was significantly lower than that of the control group.[17] Relaxation exercises reduce dyspnea with physiological effects, such as decreasing the respiratory count, heart rate, oxygen consumption, and muscle tension,[15] as well as psychological effects, such as decreasing anxiety by increasing positive sensations.[16,17] Our study findings are similar to those reported in the literature.

## The effect of PREs on anxiety

Previous studies have indicated that relaxation exercises are a supportive practice in managing anxiety, which is considered a component of dyspnea[6] and which is highly prevalent in individuals with COPD.[7,20] A systematic review, conducted to determine the effect of relaxation exercises on anxiety, found a total of 27 studies that involved intervention and control groups between 1997 and 2007; these studies reported that relaxation exercises are significantly effective in reducing anxiety.[18] In our study, it was found that the anxiety levels of patients in the intervention group had decreased at the second follow-up, which supports these findings. In our study, the anxiety levels of the intervention group, which were moderate at the first follow-up, decreased to mild after 4 weeks of PRE application. This finding suggests that PREs represent an important intervention, especially for anxiety management in COPD patients.

Similar to our study, the studies conducted by Naveen Jebakumar et al,[17] Gift et al,[20] and Renfroe[19] indicated that anxiety levels decreased in individuals with COPD in the intervention groups. As the dyspnea levels increase, so do the anxiety levels, and the "dyspnea-anxiety-dyspnea cycle" develops.[8,9] In our study, the decrease in dyspnea and anxiety levels may be due to the healing effect of PREs on this cycle.

## The effect of PREs on $FEV_1$ value and CAT score

Our study found that patients in the intervention group had a significant increase in $FEV_1$ values at the second follow-up. When examining the literature for studies conducted on this subject, it was found that Gift et al

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**TABLE 3.** Distribution of the Modified Borg, MRC Dyspnea, Beck Anxiety Inventory, and CAT Average Scores and $FEV_1$ (%) and $FEV_1$/FVC(%) Values of Patients With COPD[a]

| | Intervention Group (n = 22) | | Control Group (n = 22) | | Difference Between Intervention Group and Control Group Second Follow-up and First Follow-up | | | |
|---|---|---|---|---|---|---|---|---|
| | First Follow-up, $\bar{X} \pm SD$ | Second Follow up, $\bar{X} \pm SD$ | First Follow-up, $\bar{X} \pm SD$ | Second Follow-up, $\bar{X} \pm SD$ | Intervention Group Difference, $\bar{X} \pm SD$ | Control Group Difference, $\bar{X} \pm SD$ | Effect Size[b] (*d*) | Power |
| Modified Borg | 3.91 ± 1.51 | 3.50 ± 1.63 | 4.14 ± 1.70 | 4.27 ± 1.58 | −0.40 ± 0.59 | 0.13 ± 0.46 | | |
| *P* | **.004** | | .186 | | **<.001** | | 0.53 (medium) | 0.913 |
| MRC Dyspnea | 2.36 ± 0.49 | 2.23 ± 0.69 | 2.36 ± 0.49 | 2.36 ± 0.49 | -0.13 ± 0.35 | 0.00 ± 0.00 | | |
| *P* | .083 | | 1.000 | | .076 | | 0.28 (small) | 0.428 |
| Beck Anxiety | 23.81 ± 5.70 | 13.55 ± 5.62 | 26.50 ± 9.15 | 28.14 ± 10.15 | -10.27 ± 5.55 | 1.63 ± 4.15 | | |
| *P* | **<.001** | | .079 | | **<.001** | | 1.24 (large) | 0.999 |
| CAT | 24.09 ± 6.93 | 20.27 ± 7.73 | 24.18 ± 7.53 | 24.91 ± 7.00 | -3.81 ± 3.67 | 0.72 ± 2.22 | | |
| *P* | **<.001** | | .141 | | **<.001** | | 0.77 (large) | 0.998 |
| $FEV_1$ **(%)** | 48.14 ± 12.56 | 50.32 ± 12.34 | 50.68 ± 12.60 | 50.68 ± 12.53 | 2.18 ± 3.06 | 0.0 ± 2.91 | | |
| *P* | **.003** | | 1.000 | | **.020** | | | |
| $FEV_1$/FVC (%) | 50.73 ± 10.44 | 52.05 ± 9.85 | 54.18 ± 9.28 | 53.55 ± 10.40 | 1.31 ± 4.59 | -0.63 ± 4.65 | | |
| *P* | .192 | | .528 | | .168 | | | |

Abbreviations: CAT, COPD Assessment Test; COPD, chronic obstructive pulmonary disease; $FEV_1$, forced expiratory volume in 1 s; FVC, forced vital capacity.
[a]Bold values indicate $P < .05$.
[b]Effect sizes were interpreted according to Cohen's[37] guidelines, with threshold values of 0.20, 0.50, and 0.80 for small, medium, and large effects, respectively.

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conducted a study in which they examined the effect of PREs on respiratory function tests; the study indicated that relaxation was achieved in the intervention group, and dyspnea and airway obstruction decreased.[20] In a study conducted by Cecily and Alotaibi,[35] which evaluated the efficacy of deep breathing exercises administered for at least 10 minutes 3 times a day for 30 days, it was found that pulmonary parameters, such as $FEV_1$, FVC, $FEV_1$/FVC, and PEFR, improved at significant levels. This suggests that this condition may be associated with relaxation and decreased muscle tension, together with increased energy and decreased anxiety.

The CAT score provides data about the symptom status, dyspnea score, respiratory function values, and quality of life of the patient.[31] It was observed in our study that the CAT scores of patients in the intervention group decreased at significant levels. When the literature was reviewed, no studies were found that had been conducted on the effect of PREs on CAT scores. One study reported that the CAT scores in COPD patients indicated a correlation with anxiety, and that the CAT score may be a marker in predicting anxiety in COPD.[36] In our study, it was found that PREs reduced anxiety. All these findings suggest that PREs have a positive effect on the overall well-being of COPD patients.

In this study, none of the patients reported any side effects related to PREs. The low cost of PREs also suggests that it is an important application for the management of anxiety and dyspnea in COPD. Likewise, the study by Cecily and Alotaibi[35] also stated that deep breathing exercises are an economical method for improving the general well-being of patients with COPD.

## CONCLUSION

Progressive relaxation exercises that were done once a day for 4 weeks by individuals with COPD decreased their dyspnea and anxiety levels, and improved their overall condition regarding COPD. In line with these results, it is recommended that PREs be applied to individuals with COPD as a method that can contribute to dyspnea and anxiety management. In addition, it is recommended to plan further studies to determine the effects of PREs in individuals with COPD, especially during exacerbations, and to conduct single-blind or double-blind randomized controlled studies comparing PREs and various integrated practices for dyspnea and anxiety management.

### Limitations of the study

In this study, individuals with COPD did PREs at home on their own, and for this reason, the verbal statements of patients about the application were accepted. The follow-up of the application by telephone is considered a limitation that might have affected the execution of the study. In addition, there may be individual factors that may have affected dyspnea and anxiety at the first and second follow-ups.

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