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The effect of handheld fans on dyspnea, illness perception, anxiety, and depression in patients with chronic obstructive pulmonary disease: A randomized controlled trial

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ABSTRACT

Background: Dyspnea, negative illness perceptions, anxiety, and depression are common problems that substantially impair quality of life in patients with Chronic Obstructive Pulmonary Disease (COPD).
Objective: This study aimed to evaluate the effects of handheld fan use on dyspnea, illness perception, anxiety, and depression in patients with COPD.
Design: A randomized controlled trial.
Setting: Chest diseases clinic and polyclinic of a state hospital in eastern Türkiye.
Participants: Patients with GOLD stage III–IV COPD.
Method: The handheld fan group received daily facial fan application for 15 min over six weeks, while the control group continued standard treatment and care. Participants were allocated using block randomization. Data were collected at baseline and at week 6 using the Patient Diagnosis Form, Visual Analog Scale, Illness Perception Questionnaire, and Hospital Anxiety and Depression Scale. Researchers and the statistician were blinded. Paired and independent samples *t*-tests were used for within- and between-group comparisons.
Results: Fifty-nine participants were included in the final analysis (handheld fan group, n = 30; control group, n = 29). Baseline scores on all outcome measures were comparable between groups. Within-group analyses revealed significant reductions in dyspnea, anxiety, and depression in the handheld fan group, whereas no meaningful changes were observed in the control group. At the 6-week follow-up, between-group comparisons showed significantly lower dyspnea, anxiety, and depression scores in the handheld fan group. Significant differences were also observed in several Illness Perception Questionnaire subscales, including timeline (cyclical), personal control, treatment control, emotional representations, and psychological attributions.
Conclusions: Handheld fan use significantly improved dyspnea, illness perception, anxiety, and depression in patients with stage III–IV COPD. This simple, low-cost intervention represents a practical adjunct to standard care and may enhance both physical and psychosocial outcomes in this population.
Trial registration: ClinicalTrials.gov (NCT06857422). Registered 27 February 2025; first participant enrolled 28 February 2025.

What is already known

- Dyspnea, negative illness perception, anxiety, and depression are common problems among patients with COPD.
- Handheld fans are effective in reducing dyspnea in patients with COPD.

What this paper adds

- Handheld fan use improves illness perceptions in patients with COPD.
- Handheld fans reduce anxiety and depression in this population.
- Handheld fans represent a safe and inexpensive intervention for patients with stage III–IV COPD.

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1. Background

Chronic Obstructive Pulmonary Disease (COPD) is among the leading chronic conditions worldwide and represents a major contributor to morbidity and mortality (GOLD, 2025). A hallmark and most distressing symptom of COPD is dyspnea, which progressively limits physical activity, impairs functional capacity, and substantially reduces health-related quality of life. Persistent breathlessness often leads patients to avoid daily activities, promotes physical deconditioning, and fosters a sense of loss of bodily control. Consequently, COPD symptoms are closely linked to psychological distress, with dyspnea acting as a major trigger for anxiety and depressive symptoms (Yohannes et al., 2022). Dyspnea can increase sympathetic activity in the body, creating a stress response that can lead to anxiety. Furthermore, feelings of helplessness and loss of control caused by dyspnea can contribute to the development of depression and anxiety. Anxiety exacerbates the perception of dyspnea, while depression reduces motivation for treatment and care, decreasing adherence to treatment and negatively impacting the disease process. In addition, negative illness perceptions—such as viewing COPD as uncontrollable or inevitably progressive—have been shown to hinder engagement in self-management, reduce treatment adherence, and exacerbate symptom burden (Poletti et al., 2023). In the management of COPD, non-pharmacological interventions, alongside standard pharmacological treatment, play a crucial role in alleviating dyspnea and psychological distress, thereby fostering more adaptive illness perceptions and improving patients' participation in treatment and care (Mulhall and Criner, 2016).

Among non-pharmacological interventions used alongside optimal medical therapy, fan therapy has emerged as a simple and accessible approach for relieving breathlessness in patients with COPD. A handheld fan is a small, portable electric or battery-powered device that directs gentle airflow to the face and is used as a drug-free method to alleviate dyspnea. Facial airflow stimulates branches of the trigeminal nerve, which transmit signals to brain centers associated with respiratory control. This sensory input alters respiratory perception and creates the subjective impression of easier breathing (Simon et al., 1991; Burgess and Whitelaw, 1988; Schwartzstein et al., 1987). Beyond its physiological effects, this sensory stimulation also exerts important psychological benefits. The immediate perception of easier breathing can interrupt the cycle of panic and hypervigilance commonly associated with dyspnea, reducing fear and catastrophic interpretations of breathlessness (Bentley et al., 2023). By providing a rapid, self-initiated means of symptom relief, the handheld fan enhances patients' sense of control and self-efficacy, which are key determinants of emotional well-being and adaptive illness perceptions in chronic disease. In this way, the intervention operates simultaneously at a physical level by modulating sensory pathways involved in breathing. At the psychological level, it alleviates anxiety, restores perceived control, and supports coping during acute episodes of breathlessness (Luckett et al., 2017, 2022). Although much of the existing evidence on fan therapy originates from oncology and palliative care settings, where it is widely recommended for the management of chronic breathlessness (Bausewein et al., 2010; Galbraith et al., 2010; Qian et al., 2019; Johnson et al., 2016), its application in COPD-specific populations remains comparatively limited (Luckett et al., 2022; Marchetti et al., 2015; Atıcı et al., 2020; Yue et al., 2025). This highlights the need for disease-focused investigations evaluating both physical and psychosocial outcomes in patients with COPD. Evidence suggests that handheld fan use can reduce breathlessness in chronic respiratory disease and COPD, with additional benefits such as reduced fatigue and good acceptability (Galbraith et al., 2010; Mularski et al., 2013; Qian et al., 2019; Atıcı et al., 2020; Luckett et al., 2022; Brown et al., 2023). The handheld fan has also been reported as a beneficial application for self-management of chronic breathlessness. These studies also reported that the handheld fan is portable and easy to use, and that it alleviates breathlessness, reduces medication or oxygen use, and shortens recovery time (Luckett et al., 2017). These characteristics support the use of handheld fans as a feasible tool for daily self-management in patients with COPD, and previous studies indicate that this intervention can alleviate breathlessness through trigeminal nerve stimulation, while also reducing anxiety and enhancing perceived control. Qualitative evidence further suggests that patients perceive the fan as helpful, reassuring, and non-burdensome, supporting its acceptability as a self-management tool in routine COPD care (Brown et al., 2023; Luckett et al., 2022). Previous studies have consistently demonstrated strong associations between dyspnea severity and psychological outcomes in COPD, showing that increased breathlessness is correlated with higher levels of anxiety and depression as well as more negative illness perceptions (Yohannes et al., 2022; Poletti et al., 2023). Patients who perceive their symptoms as uncontrollable or overwhelming tend to report greater emotional distress and poorer engagement in self-management. Although indirect inferences have been made about the effects of handheld fans on cognitive and psychological outcomes in COPD patients based on their effects on shortness of breath, no studies have been found that directly evaluate the effects of handheld fans on disease perception, anxiety, and depression in COPD patients. This underscores the originality of the present study by enabling a direct psychosocial evaluation of handheld fan use in patients with COPD.

Previous non-pharmacological approaches to reduce dyspnea in patients with COPD have included pulmonary rehabilitation, breathing exercises, relaxation techniques, and physical activity programs (Mulhall and Criner, 2016). Although these interventions are effective, they often require professional supervision, structured sessions, sustained motivation, and regular attendance, which may limit accessibility and long-term adherence, particularly in older or functionally impaired patients. In this context, handheld fans offer a unique advantage as an immediately accessible, self-directed, and symptom-responsive intervention that can be used during acute episodes of breathlessness in daily life, empowering patients and enhancing their sense of control (Kocatepe and Can, 2021; Marchetti et al., 2015; Yue et al., 2025). Unlike laboratory-based studies focusing on exertional dyspnea during exercise (e.g., Marchetti et al., 2015), the present study examines handheld fan use in daily life and evaluates not only dyspnea but also cognitive and psychological outcomes, including illness perception, anxiety, and depression. Given its low cost and ease of use, handheld fan therapy may represent a scalable adjunct to symptom management in COPD. The management of patients with COPD often requires expensive medical interventions. A low-cost method such as a handheld fan yielding positive results on respiratory distress and psychological effects may reduce the financial burden on healthcare services (Brown et al., 2023). This may create significant added value for both individual patients and healthcare systems.

Assessing the effects of handheld fan use on patients' illness perceptions, anxiety, and depression is clinically important, as these cognitive and psychological factors strongly influence patients' symptom experience, treatment adherence, self-management capacity, and overall quality of life in COPD.

Therefore, this study was conducted to investigate the effect of handheld fans on dyspnea, illness perception, anxiety, and depression in patients with chronic obstructive pulmonary disease.

2. Methods

2.1. Study design, setting, and trial registration

This study employed a randomized controlled design with assessments at baseline (T0) and at 6 weeks post-intervention (T1). The trial was registered at ClinicalTrials.gov (NCT06857422). The study was conducted in accordance with the registered protocol, and no alterations were made to the study design, intervention procedures, outcome measures, or analysis plan after trial registration. Data were collected between February and September 2025 at the Chest Diseases Outpatient Department of Ardahan State Hospital.

2.2. Sample size calculation

The G*Power 3.1.9.7 software was used to calculate the required sample size. The primary outcome of the study was the dyspnea score measured using a visual analog scale (VAS). Based on a previous study by Atıcı et al. (2020), which reported mean dyspnea scores of 72.4 ± 12.1 before and 59.6 ± 13.7 after the handheld fan application, the calculated effect size was 0.99 (Atıcı et al., 2020). With a power of 95% and a significance level (α) of 0.05, the required sample size was determined to be 46 patients with COPD.

Considering a potential attrition rate of 20%, the planned sample size was increased to 56 participants. Ultimately, 60 patients were enrolled and randomized. One participant in the control group withdrew after randomization and was excluded from the final analyses. Therefore, 59 participants were included in the per-protocol analysis.

2.3. Study population and eligibility criteria

The study population consisted of patients with Global Initiative for Chronic Obstructive Lung Disease (GOLD) stage III–IV COPD who attended the chest diseases outpatient clinic for routine follow-up or consultation during the study period at the study site.

Eligibility was determined by the first researcher in collaboration with a pulmonologist, based on patients' medical records and a face-to-face screening interview. Cognitive status was evaluated using the Mini-Mental State Examination.

Inclusion Criteria

- Being 18 years of age or older
- Having GOLD Stage III-IV COPD (Forced Expiratory Volume in 1 s (FEV1)/Forced Vital Capacity (FVC) < 70%, FEV1 < 50%)
- Being oriented and cooperative
- Having no communication problems
- Not having been diagnosed with any psychiatric illness
- Mini mental state examination score >24
- Voluntarily agreeing to participate in the study

Exclusion Criteria

- Experiencing a COPD exacerbation in the past 4 weeks
- Inability to hold the fan to the face
- Use of psychiatric medication

Patients with GOLD Stage III–IV COPD were included because dyspnea is more persistent and clinically significant in advanced stages of the disease. Including patients with moderate-to-severe airflow limitation ensured that the intervention targeted individuals with a substantial symptom burden and greater psychosocial vulnerability, allowing a clearer assessment of the effects of handheld fan use on dyspnea and related psychosocial outcomes.

2.4. Recruitment procedure

Throughout the study period, participants were consecutively selected from the pulmonary clinics in the study area between February 2025 and September 2025. Patients who attended the clinic for routine follow-up or consultation were screened for eligibility according to the predefined inclusion and exclusion criteria.

Eligibility was assessed by the first researcher in collaboration with a pulmonologist. Patients who met the criteria were informed about the aim and procedures of the study. Written informed consent was obtained from those who agreed to participate, and baseline assessments (T0) were completed prior to randomization. Recruitment continued until the target sample size was reached.

2.5. Randomization and blinding

Block randomization with a fixed block size of six was used to ensure balanced allocation between groups throughout the enrolment period (Kanik et al., 2011). After eligibility was confirmed, written informed consent was obtained and baseline assessments (T0) were completed. Participants were assigned sequential identification numbers according to their order of enrollment.

The randomization sequence (labeled “A” and “B”) was generated in advance using Randomizer.org by a researcher not involved in recruitment, data collection, or intervention delivery (“Randomizer.org”, 2024). Allocation was concealed until baseline assessments were completed.

Following T0, an independent nurse determined the correspondence between allocation codes and study groups by drawing lots (A = Handheld Fan Group; B = Control Group). The enrolling researcher was informed of group assignments only after this procedure.

Due to the nature of the intervention, participants were not blinded to group allocation. To reduce potential bias, statistical analyses were performed using coded group labels (“Group 1” and “Group 2”) by a statistician who was blinded to allocation. Participants from different groups were scheduled at separate times to minimize contamination.

2.6. Intervention

Following baseline assessment (T0), patients were assigned to either the handheld fan or control group. Patients in the handheld fan group were provided with a battery-operated three-speed handheld fan and instructed on its use. Since previous studies have reported effective relief of breathlessness when the handheld fan is held approximately 15 cm from the center of the face, this distance was selected for the present intervention (Kocatepe et al., 2021; Khor et al., 2021). The intervention was performed once daily for 10 min while the patient was seated and at rest, using the fan at the second speed setting (Luckett et al., 2017; Smith et al., 2022).

The first researcher initiated the intervention and contacted patients daily to promote adherence. During daily phone calls, participants were asked whether they were using the fan according to the instructions, and any deviations from the protocol or compliance issues were inquired about and recorded. No participant reported any compliance issues during this process, indicating that the program proceeded as planned for six weeks. The handheld fan application was continued for 6 weeks, resulting in a total of 42 sessions (Smith et al., 2022; Atıcı et al., 2020; Bausewein et al., 2010).

Participants in the control group continued their usual daily activities and received routine medical treatment and standard clinical care for chronic obstructive pulmonary disease, as provided by the hospital. No additional non-pharmacological interventions, educational programs, or device-based applications were introduced. Both groups maintained their usual lifestyle and care throughout the study period, with the handheld fan application being the only systematic difference between groups.

2.7. Collection of research data

The primary outcome of the study was the severity of dyspnea. Secondary outcomes were illness perception, anxiety, and depression. Research data were collected using the Patient Diagnosis Form, Visual Analog Scale (VAS), Illness Perception Questionnaire (IPQ), and the Hospital Anxiety (HAD-A) and Depression(HAD-D) Scale (HADS).

2.7.1. Patient diagnosis form

Developed based on a review of the literature, this form consists of 11 questions inquiring about the patient's age, gender, marital status, employment status, economic status, place of residence, the presence of chronic diseases other than COPD, duration of COPD diagnosis, previous

use of handheld fans, smoking status, and disease stage.

2.7.2. VAS

This is a measure that provides a subjective assessment of dyspnea severity. It is applied by marking with a pencil on a 100 mm horizontal line. A score of 0 mm indicates no dyspnea, while 100 mm represents the most severe dyspnea. The score is obtained by measuring the marked area with a ruler. Higher scores indicate greater perceived breathlessness (Kara and Yildiz, 2013). Participants were asked to rate their current level of breathlessness at rest at the time of assessment. Thus, VAS scores reflected momentary perceived dyspnea rather than peak or average symptoms over a longer period.

2.7.3. IPQ

Originally developed by Weinmann and colleagues to assess illness perception, the scale was revised by Moss-Morris et al. in 2002. The Turkish validity and reliability study of the scale was conducted by Kocaman et al. in 2007 (Kocaman et al., 2007). The scale consists of three sections: "Identity", "Timeline", and "Causal Attributions". The first section of the scale is scored as yes/no, while the perception and causes sections are scored on a five-point Likert scale. The Identity (symptoms) section includes the 14 most frequently reported symptoms and evaluates the presence of various disease symptoms in the patient. In this section, the sum of the "yes" responses is evaluated as the illness identity dimension, and a high score indicates a strong belief that the patient has the disease. The section on illness perceptions includes the following subscales: timeline (acute/chronic), timeline (cyclical), consequences, personal control, treatment control, illness coherence and emotional representations. A high score on the timeline (acute/chronic) subscale indicates that the individual perceives their condition as chronic, a high score on the timeline (cyclical) subscale indicates that the individual feels their condition follows a cyclical course, a high score on the outcomes subscale indicates that the individual believes the outcomes are negative, a high score on the personal control subscale indicates that the individual has positive beliefs about being able to control their illness, a high score on the treatment control subscale indicates that the individual believes they can control their treatment, a high score on the understanding of illness subscale indicates that the individual personally understands their condition, and a high score on the emotional representations subscale indicates high levels of negative emotions. The causal attributions section consists of 18 items and is scored on a five-point Likert scale. This section comprises four subscales: psychological attributions (6 items), risk factors (7 items), immunity (3 items), and accident or chance (2 items) (Moss-Morris et al., 2002; Kocaman et al., 2007). In the Turkish adaptation study, the internal consistency coefficients were reported as 0.89 for the identity section, 0.69–0.77 for the illness perception subscales, and 0.25–0.72 for the causes section. Factor analysis revealed a seven-factor structure for the illness perception section and a four-factor structure for the causes section (Kocaman et al., 2007). In the present study, Cronbach's alpha values were 0.72 at T0 and 0.71 at T1.

2.7.4. HADS

Developed by Zigmond and Snaith in 1983, this scale was designed to determine the levels of anxiety and depression in individuals with physical illnesses and those seeking primary health care services. The scale is scored on a four-point Likert scale. The Turkish validity and reliability study was conducted by Aydemir et al. (1997). It consists of two subscales, HAD-A and HAD-D, and a total of 14 items. The seven items with odd numbers measure anxiety, and the seven items with even numbers measure depression. The cutoff scores are 10–11 for the HAD-A and 7–8 for HAD-D. Scores above these thresholds indicate an increased risk of anxiety and depression. The lowest possible score on the scale is 0, and the highest possible score is 21. In the Turkish validity and reliability study, the Cronbach's alpha coefficients were reported as 0.85 for the anxiety subscale and 0.77 for the depression subscale. The Turkish validation study reported acceptable reliability (Aydemir et al., 1997). In the present study, Cronbach's alpha coefficients for HADS indicated high internal consistency. For HAD-A, Cronbach's alpha was 0.94 at baseline and 0.94 at follow-up, while for HAD-D it was 0.85 at baseline and 0.93 at follow-up.

These instruments were selected because they captured both the sensory and emotional dimensions of breathlessness that were theoretically targeted by the handheld fan. VAS reflected the subjective perception of dyspnea, which was directly influenced by trigeminal nerve stimulation and altered respiratory sensation induced by facial airflow. HADS assessed emotional responses that were closely linked to dyspnea-related fear, hypervigilance, and loss of perceived control. By modulating sensory input and providing an immediate perception of easier breathing, the handheld fan was expected to influence both perceptual and emotional pathways, making VAS and HADS appropriate outcome measures for evaluating its multidimensional effects.

2.8. Data collection procedure

At baseline (T0), the Patient Diagnosis Form, VAS, IPQ, and HADS were administered to both groups. At the 6th week (T1) the study was completed by re-administering VAS, IPQ, and HADS.

Although the study period spanned winter to summer, both the intervention and control groups were recruited and assessed in parallel in the same clinical setting, ensuring that all participants experienced the same seasonal and environmental conditions. This concurrent enrollment minimized potential confounding effects of temperature or airflow perception on the outcomes of handheld fan use.

2.9. Data analysis

The SPSS version 26 software package was used to analyze the research data. Sociodemographic variables for the handheld fan and control groups were presented as frequencies, percentages, means, and standard deviations. The chi-square test was used to examine the homogeneity of the distribution of descriptive variables. Skewness and Kurtosis values within ± 2 were used to assess the normality of the research data (George and Mallery, 2020). The primary and secondary outcome variables, including dyspnea (Visual Analog Scale), illness perception, anxiety, and depression scores, were found to be normally distributed; therefore, parametric tests were applied. The paired-samples t-test was used for within-group comparisons, and the independent samples t-test was used for between-group comparisons. Cohen's d effect size was calculated to assess the magnitude of the differences. Effect sizes of differences in scores between groups were calculated using Cohen's d, defined as the difference between means divided by the combined standard deviation. According to traditional threshold values, effect sizes were interpreted as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) (Cohen, 2013). All statistical tests were two-tailed, and a p value <0.05 was considered statistically significant.

One participant in the control group withdrew after randomization and was not included in the analyses. Therefore, analyses were conducted on participants who completed the study (per-protocol analysis).

2.10. Research ethics

Prior to the research, ethical approval was obtained from the Ardahan University Scientific Publication and Ethics Committee on 25.10.2024 with the reference number E-67796128-819-2400036088. Institutional permission was obtained from the Ardahan Provincial Health Directorate on 13 December 2024, with reference number E-26687954-799-262300071. Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki.

All participants were informed about the purpose, procedures,

potential benefits, and possible risks of the study in clear and comprehensible language. Participation was entirely voluntary, and participants were informed that they could withdraw at any time without any consequences for their medical care.

Confidentiality was ensured by anonymising all data and storing them securely, with access restricted to the research team. The handheld fan intervention posed minimal risk, and participants were monitored regularly to ensure comfort and safety throughout the study.

3. Results

The results are organized under the following subheadings. The study flow diagram is provided in Fig. 1.

3.1. Baseline characteristics

Table 1 presents the characteristics of the handheld fan and control groups. The two groups were homogeneous, with no significant differences in gender, marital status, educational status, employment status, economic status, place of residence, comorbidities, smoking status, previous use of handheld fans, disease stage, age at COPD diagnosis, and Mini-Mental Test scores.

3.2. Primary outcome: dyspnea

At T0, dyspnea scores were similar between groups (Table 2). At T1, participants in the handheld fan group exhibited a marked reduction in perceived breathlessness compared with the control group. Within the intervention group, dyspnea decreased significantly from T0, whereas no meaningful change was observed in the control group.

No systematic non-adherence or major protocol deviations were identified during the intervention period.

3.3. Secondary outcomes: anxiety and depression

Anxiety and depression scores were comparable between groups at T0. Following the intervention, both anxiety and depression decreased in the handheld fan group, while remaining largely unchanged in the control group. Between-group comparisons at T1 revealed significantly lower anxiety and depression levels among participants who used the handheld fan (Table 2).

At follow-up, between-group effect sizes were moderate to large for dyspnea (Cohen's d = 0.68), anxiety (d = 0.71), and depression (d = 0.73), indicating a clinically meaningful impact of the handheld fan intervention.

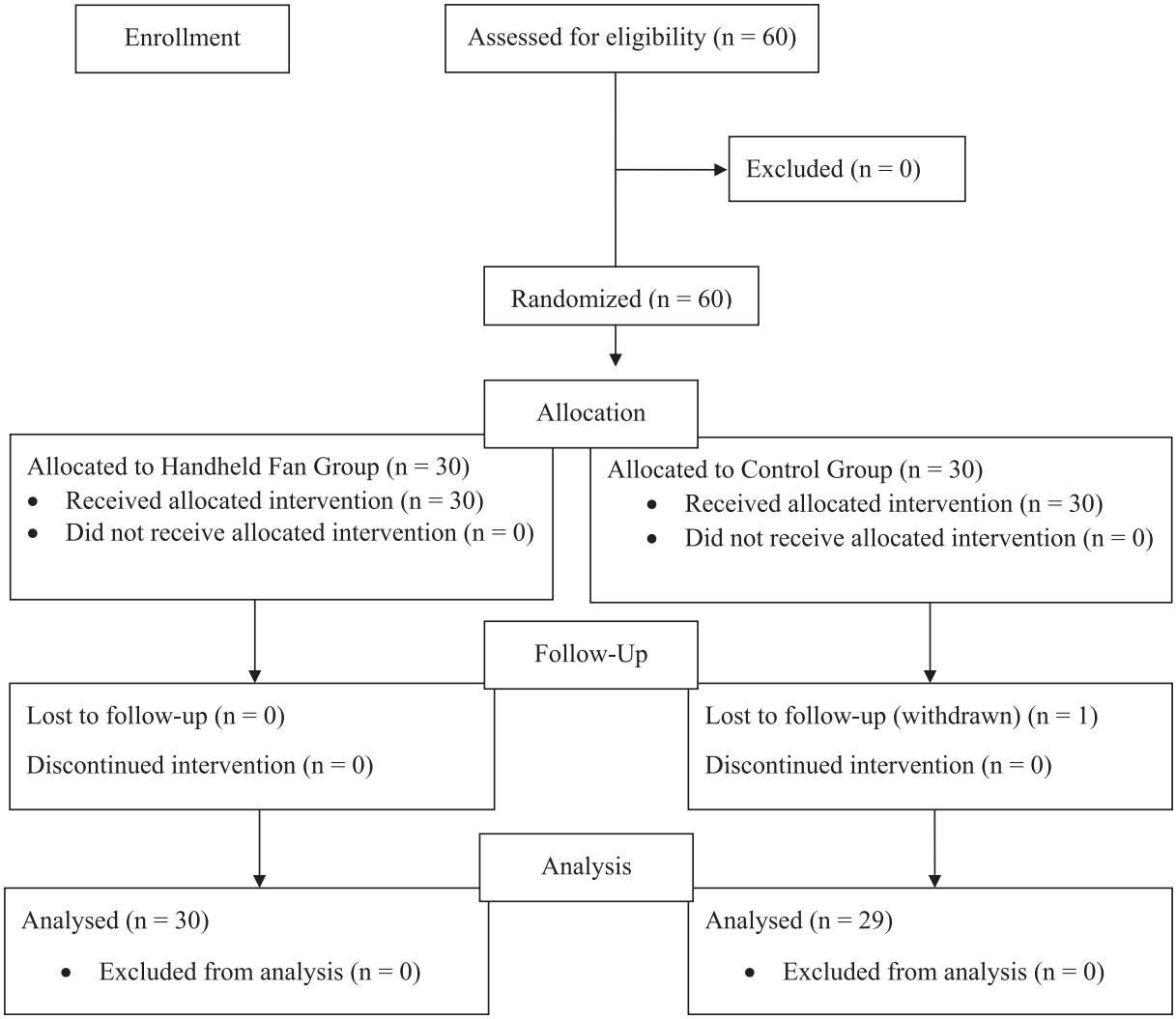

Fig. 1. CONSORT flow diagram.

Table 1
Descriptive data for COPD patients (N = 59).

Characteristics	HFG (n = 30)	CG (n = 29)
Gender		
Female	15 (50.0)	9 (31.0)
Male	15 (50.0)	20 (69.0)
Marital status		
Married	19 (63.3)	24 (82.8)
Single	11 (36.7)	5 (17.2)
Education status		
Literate	18 (60.0)	22 (75.9)
Elementary education	8 (26.7)	4 (13.8)
High school	4 (13.3)	3 (10.3)
Work status		
Working	4 (13.3)	1 (3.4)
Not working	26 (86.7)	28 (96.6)
Economic situation		
Good	2 (6.7)	1 (3.4)
Moderate	15 (50.0)	13 (44.8)
Poor	13 (43.3)	15 (51.7)
Place of residence		
Province	4 (13.3)	6 (20.7)
District	10 (33.3)	12 (41.4)
Village	16 (53.3)	11 (37.9)
Comorbid disease		
Present	29 (96.7)	29 (100.0)
Absent	1 (3.3)	0 (0.0)
Previous use of a handheld fan		
Yes	0 (0.0)	0 (0.0)
No	30 (100.0)	29 (100.0)
Smoking		
I smoke	6 (20.0)	2 (6.9)
I have never smoked	14 (46.7)	11 (37.9)
I quit	10 (33.3)	16 (55.2)
Disease stage		
Stage III	24 (80.0)	23 (79.3)
Stage IV	6 (20.0)	6 (20.7)
	Mean (SD)	Mean (SD)
Age	73.30 (10.37)	75.79 (10.21)
Year of COPD diagnosis	7.50 (5.58)	8.72 (6.21)
Mini-mental state examination	27.13 (0.63)	27.28 (0.70)

Note. Data are presented as n (%), Mean (SD). HFG, Handheld Fan Group; CG, Control Group.

3.4. Secondary outcomes: illness perception

All illness perception subscales were similar between groups at T0 (Table 3). At T1, significant between-group differences emerged in several domains. Participants in the handheld fan group reported more favorable perceptions in terms of cyclical timeline, personal control, and treatment control, alongside lower emotional burden and psychological attribution of illness. Within-group analyses further showed that illness identity, emotional representations, and reduced psychological attributions improved over time in the handheld fan group, whereas no significant changes were observed in the control group.

4. Discussion

This randomized controlled trial demonstrated that daily handheld fan use over six weeks significantly reduced dyspnea, anxiety, and depression in patients with COPD compared with standard care. At T1, participants in the handheld fan group showed clinically meaningful improvements, with moderate to large between-group effect sizes for dyspnea (Cohen's d = 0.68), anxiety (d = 0.71), and depression (d = 0.73). These findings indicate that the handheld fan use is not only statistically effective but also clinically meaningful for symptom management in this population.

4.1. Effects of the intervention on dyspnea

Dyspnea levels were assessed using a VAS in the study, and VAS scores of the handheld fan and control groups were found to be similar in T0. At T1, VAS score of the handheld fan group, which underwent 42 handheld fan sessions, a significant decrease was observed compared to T0, and when compared to the control group, VAS score of the handheld fan group was found to be statistically significantly lower. These findings indicate that handheld fan use is effective in reducing dyspnea in patients with COPD. Although the between-group improvement of 6 points on the 0–100 mm VAS corresponds to a moderate effect size (Cohen's d = 0.68), it is slightly below the commonly reported minimal clinically important difference for chronic breathlessness in patients with COPD, which is approximately 9–10 mm (Ekström et al., 2020). Therefore, while this reduction may confer some improvement in comfort and activity tolerance, it should be interpreted with caution regarding its clinical meaningfulness. These findings are consistent with previous studies reporting beneficial effects of handheld fan use on dyspnea in patients with COPD and other chronic respiratory conditions (Luckett et al., 2022; Smith et al., 2022; Kocatepe et al., 2021; Qian et al., 2019).

The effect of handheld fans on dyspnea has been explained in several ways in the literature. Facial airflow is thought to stimulate cutaneous receptors in areas innervated by the trigeminal nerve, activate upper airway mucosal receptors, and reduce central respiratory drive. Additional mechanisms include enhanced facial airflow along the midline, distraction, and a reduction in facial skin temperature (Yue et al., 2025; Marchetti et al., 2015; Morélot-Panzini, 2017). In a study in which handheld fans were applied to patients with COPD for eight weeks, Atıcı et al. (2020) reported significant reductions in both dyspnea and fatigue (Atıcı et al., 2020). Building on these established effects, the present study extended the evaluation to patients' cognitive and psychological outcomes, specifically their illness perceptions, anxiety, and depression.

Unlike several earlier studies that included heterogeneous respiratory populations or palliative cohorts, the present trial focused exclusively on patients with advanced COPD (GOLD stages III–IV), demonstrating that the handheld fan remains effective even in more severe disease. Moreover, the daily, structured use over six weeks may explain the sustained improvement observed at follow-up, whereas studies using shorter or less standardized applications have tended to report smaller effects. Together, these similarities and differences suggest that both disease severity and intervention intensity may influence the magnitude of benefit.

Table 2
Comparison of Visual Analog Scale (VAS), Hospital Anxiety (HAD-A) and Depression (HAD-D) Scale scores within and between groups of COPD patients.

Outcome	HFG T0 Mean (SD)	HFG T1 Mean (SD)	CG T0 Mean (SD)	CG T1 Mean (SD)	Within-group p (HFG)	Within-group p (CG)	Between-group p (T1)	Cohen's d
VAS	82.56 (8.57)	76.57 (8.09)	82.07 (8.50)	82.24 (8.61)	<0.001[a]	0.326[a]	0.017[b]	0.68
HAD-A	11.76 (7.53)	6.26 (5.57)	10.72 (5.75)	10.45 (5.39)	<0.001[a]	0.147[a]	0.005[b]	0.71
HAD-D	13.63 (5.84)	6.96 (5.62)	11.69 (5.50)	11.65 (5.47)	<0.001[a]	0.882[a]	0.002[b]	0.73

Note. Data are presented as n (%), Mean (SD). HFG, Handheld Fan Group; CG, Control Group; T0 = baseline assessment; T1 = 6 weeks after the intervention.
[a] Paired samples t-test.
[b] Independent samples t-test.

Table 3
Comparison of sections and subdimensions of the illness perception questionnaire for COPD patients within groups and between groups.

Outcome	HFG T0 Mean (SD)	HFG T1 Mean (SD)	CG T0 Mean (SD)	CG T1 Mean (SD)	Within-group p (HFG)	Within-group p (CG)	Between-group p (T1)	Cohen's d
IPQ-Identity	7.53 (2.91)	6.33 (3.49)	6.69 (2.44)	6.62 (2.45)	0.007[a]	0.602[a]	0.717[b]	−0.096
Timeline (acute/chronic)	18.06 (5.63)	16.30 (4.20)	17.93 (3.05)	17.48 (1.72)	0.044[a]	0.285[a]	0.165[b]	−0.35
Timeline (cyclical)	12.80 (4.29)	12.97 (3.10)	11.14 (4.09)	11.00 (4.30)	0.755[a]	0.526[a]	0.048[b]	0.53
Consequences	19.90 (6.71)	18.50 (5.41)	18.03 (3.89)	17.41 (3.07)	0.078[a]	0.077[a]	0.349[b]	−0.23
Personal control	18.93 (4.73)	19.36 (3.06)	17.76 (2.81)	17.75 (3.08)	0.466[a]	1.000[a]	0.049[b]	0.52
Treatment control	18.93 (3.90)	19.64 (4.15)	17.07 (3.50)	17.93 (4.02)	0.004[a]	0.060[a]	0.001[b]	0.42
Illness coherence	18.56 (4.62)	18.13 (4.15)	17.17 (4.16)	17.13 (4.08)	0.483[a]	0.801[a]	0.357[b]	−0.10
Emotional representations	16.43 (6.92)	13.03 (4.96)	15.83 (5.18)	16.03 (4.88)	0.006[a]	0.562[a]	0.023[b]	0.61
Psychological attributions	13.63 (5.62)	10.00 (3.43)	15.03 (5.82)	15.34 (5.62)	0.007[a]	0.354[a]	<0.001[b]	1.15
Risk factors	17.20 (5.95)	18.53 (3.39)	19.27 (4.18)	18.69 (5.13)	0.149[a]	0.209[a]	0.890[b]	−0.05
Immunity	8.00 (2.82)	8.50 (2.49)	7.41 (3.13)	7.48 (3.12)	0.142[a]	0.691[a]	0.171[b]	0.03
Accident or chance	3.86 (2.36)	4.33 (1.63)	4.45 (2.02)	4.55 (2.08)	0.273[a]	0.522[a]	0.654[b]	−0.05

Note. Data are presented as n (%), Mean (SD). HFG, Handheld Fan Group; CG, Control Group; T0 = baseline assessment; T1 = 6 weeks after the intervention.
[a] Paired samples t-test.
[b] Independent samples t-test.

4.2. Effects on illness perception

In the present study, illness perception was assessed using IPQ, which does not yield a total score but is interpreted through its subdimensions. In the handheld fan group, significant improvements were observed in illness identity, timeline (acute/chronic), emotional representations, and psychological attributions, alongside a significant increase in treatment control. These changes indicate a reduced perception of the disease as inevitably chronic, enhanced beliefs in personal and treatment control, and a more positive and manageable view of the illness. No previous study has directly evaluated the effect of handheld fan use on illness perception in patients with COPD, highlighting the originality of the present findings. A previous study examining illness perception prior to pulmonary rehabilitation found that patients' beliefs about their illness influenced post-rehabilitation exercise capacity and quality of life, underscoring the clinical relevance of illness perception in COPD (Zoeckler et al., 2014). Similarly, a nurse-led intervention targeting illness perception resulted in short-term improvements in personal control and health-related behaviors, although long-term changes in overall health status were not observed (Weldam et al., 2017). These findings demonstrate that illness perception is modifiable and that such changes can influence health behaviors. In the present study, the handheld fan contributed to this process by providing patients with an immediate, self-directed means of coping with breathlessness. The observed improvements suggested that patients in the intervention group began to view their symptoms as more manageable and less overwhelming. Notably, illness perception in COPD has been shown to be closely associated with anxiety and depression (Ovcharenko et al., 2022). Enhancing positive perceptions of illness may also contribute to improved psychological well-being (Zoeckler et al., 2014).

4.3. Effects on psychological outcomes

In this study, patients' anxiety and depression levels were assessed using HADS. A decrease of 5.50 units was observed in the handheld fan group for anxiety compared to the T0 measurement, and a decrease of 6.67 units was observed in depression. When examining the effect sizes, the difference was found to be statistically significant with a moderate effect size (Cohen d = 0.71, 0.73). Considering that clinically significant changes in HADS -Anxiety (−1.7 ± 3.7 points) and Depression (−2.1 ± 3.7 points) have been reported in the literature (Smid et al., 2017), the difference in this study can be considered both statistically and clinically significant. Based on the effect sizes for both variables, handheld fan use was shown to reduce anxiety and depression in patients with GOLD stage III–IV COPD.

Several mechanisms may explain these effects. First, airflow directed at the face reduces the perception of dyspnea via trigeminal nerve stimulation, thereby interrupting the dyspnea–anxiety cycle (Galbraith et al., 2010; Luckett et al., 2017, 2022). Second, because handheld fans are simple, immediately accessible, and entirely patient-controlled, they may enhance self-efficacy and perceived control, leading to psychological relief (Swan et al., 2019). Qualitative studies report that handheld fans generate positive sensations, such as a feeling of “opening up” the breath and promoting faster recovery (Luckett et al., 2022; Johnson et al., 2016). Taken together, these mechanisms suggest that reductions in dyspnea, improvements in self-management skills, and enhanced disease control jointly contribute to decreases in anxiety and depression.

Although previous studies have demonstrated that handheld fan use reduces dyspnea in individuals with COPD, no prior trials have directly examined its effects on anxiety and depression. The present study is therefore notable in that it evaluates both respiratory and psychological outcomes of handheld fan use.

4.4. Overall interpretation and clinical implications

Overall, these findings suggest that handheld fan use offers benefits beyond symptom relief. By reducing breathlessness and enhancing patients' sense of control and self-efficacy, this simple, low-cost, and patient-controlled intervention contributes to meaningful improvements in emotional well-being and illness appraisal in advanced COPD (Ekström et al., 2022; Luckett et al., 2022; Atıcı et al., 2020; Smith et al., 2022). Even modest improvements in dyspnea and psychological distress are clinically valuable in this population, where symptom burden is high and therapeutic options are limited.

While supporting its effectiveness, handheld fan use should be viewed as a complementary strategy rather than a standalone treatment, and it is unlikely to replace comprehensive approaches such as pulmonary rehabilitation or pharmacological management. However, repeated daily use may reinforce adaptive coping, interrupt maladaptive fear–dyspnea cycles, and promote sustained symptom management. During daily compliance checks, no participants reported compliance issues, supporting the feasibility and sustainability of the intervention. These findings further support its safety and applicability in hospital, outpatient, and home-care settings (Luckett et al., 2017; Bausewein et al., 2010; Brown et al., 2023).

From a nursing perspective, handheld fans are practical, teachable, and easily integrated into routine care, empowering patients to manage breathlessness effectively. Nurses can introduce the intervention, provide brief guidance, and encourage application during symptomatic

episodes, enhancing self-management and reducing distress (Swan et al., 2019; Luckett et al., 2022).

Future research should evaluate optimal fan parameters (airflow, duration, frequency), long-term effects, and applicability in heterogeneous COPD populations, including those with psychiatric comorbidities or undergoing pulmonary rehabilitation. Incorporating multidimensional dyspnea instruments and objective physiological measures would further strengthen evidence and generalizability.

4.5. Limitations

This study has several limitations that should be considered when interpreting the findings. First, it was conducted in a single state hospital located in a province in eastern Turkey. As a single-center study, the findings may not be generalizable to the broader COPD population or to other healthcare settings. In addition, the sample consisted exclusively of patients with GOLD stage III–IV COPD; therefore, comparisons with patients in mild or moderate stages of the disease were not possible.

One point to note for this study is the relatively high level of resting dyspnea in patients with advanced COPD. Although the majority of participants were in Stage III, the inclusion of Stage IV patients may have contributed to the increased baseline dyspnea levels. Furthermore, the lack of access to detailed pulmonary functional parameters such as FEV1, TLC/RV, 6-minute walk test (6MWT), mMRC, or GOLD classification for all participants limits the comprehensive presentation of baseline clinical characteristics. Therefore, generalizations of these study findings to a COPD population with mild symptoms should be interpreted with caution.

The handheld fan intervention and follow-up period were limited to six weeks, and the long-term sustainability of the observed effects remains unknown. Participants used the fan in their home environments, where various uncontrolled factors—such as ambient airflow, temperature, and stress levels—may have influenced their experiences. These environmental conditions could not be standardized.

All outcomes in the present study were assessed using self-report instruments. Although validated scales were employed, self-assessment may be influenced by participants' expectations, mood, and social desirability, particularly in the context of an unblinded behavioral intervention. Furthermore, while internal consistency was acceptable in the present sample, some subscales—especially within the Illness Perception Questionnaire—have demonstrated variable reliability in previous studies, which may have affected measurement precision. In addition, objective physiological measures, such as pulmonary function tests, were not included. The absence of such indicators limits the evaluation of the physiological effects of the intervention and restricts interpretation to subjective outcomes.

Patients with diagnosed psychiatric disorders and those using psychiatric medication were excluded. Although this criterion was applied to better isolate the effects of the handheld fan on anxiety and depression, it may have introduced selection bias, given that anxiety and depressive symptoms are highly prevalent among individuals with COPD. Consequently, the study sample may not fully represent the broader COPD population encountered in routine clinical practice. The findings may therefore primarily reflect the effects of the intervention in patients without clinically diagnosed psychiatric disorders. Future studies should include patients with comorbid psychiatric conditions to evaluate the effectiveness of handheld fan use in more heterogeneous and clinically representative COPD populations.

Dyspnea was assessed using a unidimensional visual analog scale, which may not fully capture the multidimensional nature of breathlessness. Moreover, because participants could not be blinded to the intervention, all outcomes relied on self-assessment and may have been influenced by expectations or perceived benefit. Potential co-interventions—such as changes in physical activity or participation in pulmonary rehabilitation—were not systematically recorded and may have differed between groups in the absence of participant blinding.

Finally, although participants were instructed in standardized fan use, the exact airflow intensity could not be objectively verified in the home setting. Variations in fan speed and positioning may have influenced the magnitude of perceived benefit, as greater airflow intensity could plausibly be associated with stronger symptom relief.

5. Conclusions

The present findings indicate that handheld fan use has significant effects on dyspnea, as well as on patients' cognitive and psychological outcomes, including their illness perceptions, anxiety, and depression, in patients with stage III–IV COPD. Although these findings are consistent with previous studies on dyspnea, they extend the literature by providing direct quantitative evidence on psychosocial outcomes. Due to its low cost, safety, and ease of application, handheld fans can be integrated into treatment and care to improve quality of life in patients with COPD. Future research should include longer-term randomized controlled trials involving patients with COPD across different disease stages.

CRediT authorship contribution statement

Derya Şimşekli: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kader Öztürk:** Writing – review & editing, Writing – original draft, Software, Project administration, Data curation.

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Declaration of competing interest

There is no conflict of interest among the researchers.

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Data availability

The de-identified participant data, data dictionary, and statistical code used in this study are available from the corresponding author upon reasonable request. Data will be shared after publication and completion of all planned analyses, and for research purposes only.

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