Original Research

Open Access

Belitung Nursing Journal
Volume 10(4), 378-388

https://doi.org/10.33546/bnj.3393

The effects of a symptom management program on symptom experience and physical function in Thai adults with chronic obstructive pulmonary disease: A single-blind randomized controlled trial study

Apinya Kochamat[1], Teeranut Harnirattisai[1*], and Evanne Juratovac[2,3,4]

[1]Faculty of Nursing, Thammasat University, Pathum Thani, Thailand
[2]Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, Ohio, USA
[3]Department of Psychiatry, School of Medicine, Case Western Reserve University, Cleveland, Ohio, USA
[4]University Center on Aging and Health, Case Western Reserve University, Cleveland, Ohio, USA

Abstract

Background: Adults with Chronic Obstructive Pulmonary Disease (COPD) experience a range of unpleasant symptoms, including fatigue, dyspnea, sleep disturbances, anxiety, and depression, that are interrelated and impact one another. Developing a program to handle simultaneous symptoms poses challenges but offers advantages for adults with COPD in efficiently managing symptoms.

Objective: This study aimed to determine the effects of a symptom management program on symptom experience and physical function in Thai adults with COPD.

Methods: A randomized controlled trial (RCT) with a Repeated Measures design was performed. One hundred and two participants were allocated randomly to either the control group (n = 51) or the experimental group (n = 51). The experimental group received eight weeks of the symptom management program and usual care, while the control care group received only usual care. Data were collected from January 2023 to August 2023 at baseline, 4th weeks, and 8th weeks using the demographic data, the modified Medical Research Council (mMRC), the Pittsburgh Sleep Quality Index (PSQI), the Multidimensional Assessment of Fatigue (MAF), the Hospital Anxiety and Depression Assessment Scale (HADS), the COPD Assessment Test (CAT), and 6-Minute Walk Distance (6-MWD). The hypotheses were analyzed using Repeated Measures Multivariate Analysis of Variance (MANOVA).

Results: The symptom management program significantly impacted the experimental group's symptom experience and physical function at Weeks 4 and 8 (F = 5.257, p <0.001). There were significantly improved mean scores for the mMRC, MAF, 6MWD, and CAT (p <0.001, p <0.05). No statistically significant differences were observed in the PSQI, HADS-Anxiety, and HADS-Depression over time.

Conclusion: Implementing a symptom management program can help patients with COPD efficiently manage their symptoms. In clinical settings, nurses should integrate this program into routine nursing care to enhance the quality of life for patients suffering from COPD. The program can help patients preserve physical functionality while reducing dependence on family and society.

Trial Registry Number: Thai Clinical Trials Registry (TCTR20230111006)

Keywords

Thailand; symptom experience; physical function; symptom management program; chronic obstructive pulmonary disease; depression; anxiety; fatigue; quality of life; sleep quality

***Corresponding author:**
Teeranut Harnirattisai, RN, MSN, Ph.D
Faculty of Nursing, Thammasat University, 99 Paholyotin Road, Khlongluang, Pathum Thani 12121, Thailand
Email: harnirat@gmail.com

Article info:
Received: 16 April 2024
Revised: 23 May 2024
Accepted: 24 June 2024

E-ISSN: 2477-4073 | P-ISSN: 2528-181X

Background

Chronic Obstructive Pulmonary Disease (COPD) represents a significant health problem that impacts both the physical and psychological aspects. By 2050, it is projected that the worldwide incidence of COPD will reach approximately 600 million cases, representing a 23% increase in the number of individuals affected by COPD compared to 2020 (Boers et al., 2023). Adults with COPD still have significant obstacles with functional and psychosocial consequences (Mathews, 2023). A negative association exists between the quality of life and the burden of symptoms (Zhang et al., 2023). Therefore, it is

imperative to encourage patients to adhere to therapies, manage symptoms, adjust their lifestyles, and cope with the physiological and psychological consequences of the disease.

Symptom management theory is essential to understanding individuals' symptom experiences, developing appropriate management strategies, and evaluating outcomes. Symptom experience encompasses an individual's perception, evaluation, and response to symptoms. Symptom management strategies aim to prevent, minimize, or reduce symptom experience. Outcomes result from these strategies and the symptoms experienced (Dodd et al., 2001). This study focuses on participants' experiences with symptoms, specifically fatigue, dyspnea, sleep disturbance, anxiety, and depression. Physical function is the ability to perform exercise, as assessed by the 6-minute walk test. The main physiological and psychological symptoms of COPD include fatigue, dyspnea, anxiety, and depression (Lee et al., 2018). Sleep quality correlates with dyspnea and fatigue (Reishtein, 2005). Adults with COPD often experience interrelated physiological and psychological symptoms simultaneously, which directly impact physical functioning (Lee et al., 2018). Thus, the interplay between symptom experience and physical function is crucial in evaluating the effectiveness of symptom management programs.

Nurses are crucial in helping patients understand symptoms and developing effective symptom management strategies. Developing appropriate and feasible symptom management programs can enhance patients' ability to manage symptoms effectively. Implementing practical management strategies that patients can integrate into their daily lives can improve symptom outcomes. Patients with COPD experiencing multiple symptoms should be encouraged to participate in interventions focusing on disease knowledge and coping strategies, which are essential for managing their symptoms (Bentsen et al., 2013). Consequently, comprehensive symptom management strategies need to be developed in symptom management research (Miaskowski et al., 2004), as patients with COPD need to acquire knowledge and skills to manage multiple symptoms, foster self-reliance, and reduce dependence on family care.

Non-pharmacological interventions have been found to reduce the psychological and physical symptoms of COPD effectively. Exercise is critical in relieving symptoms and activity limitations in COPD patients (Lin & Yeh, 2021). Walking is commonly employed in endurance exercise for rehabilitation because it is practical and enhances walking abilities rapidly (Spruit et al., 2013). Mindfulness walking has been shown to reduce dyspnea, depression, and anxiety while significantly improving exercise tolerance in patients with COPD (Lin & Yeh, 2021; Lin et al., 2019; Seetee et al., 2016). However, One study found no evidence that mindfulness walking alleviates dyspnea (Lin & Yeh, 2021). Given these inconsistent results, this study aims to investigate the effects of mindfulness walking on dyspnea. Additionally, no studies have examined the impact of mindfulness walking or Buddhist walking meditation on symptoms of fatigue or sleep disturbance, which are commonly associated with dyspnea, anxiety, and depression in patients with COPD.

This symptom management program was developed to align with the Thai social context, focusing on activities that are easy to perform, convenient for adaption to real life, and feasible to undertake independently with family support. Involving family members in rehabilitation programs can improve the family's ability to manage COPD effectively (Marques et al., 2015). Furthermore, this program applied technology-based interventions that may help patients access care and conveniently monitor behavior. Technology-based interventions, such as the internet, mobile devices, and wearable technology, have been effective in managing COPD (Long et al., 2023). Consequently, the researchers integrated health education, pedometer-promote walking, Buddhist walking meditation, family support, and technology-based interventions into a symptom management program based on symptom management theory.

This study aimed to determine the program's effectiveness in enhancing symptom experience and physical function. The findings will contribute to advancing nursing interventions and research on symptom management for future patients with COPD.

Methods

Study Design

This study conducted a randomized controlled trial with a Repeated Measures design and followed the guidelines in the CONSORT (Consolidated Standards of Reporting Trials) statement (Schulz et al., 2010).

Samples/Participants

This study was conducted at the COPD Clinic at one hospital in Mahasarakham Province, Northeastern Thailand. The inclusion criteria were: 1) Stable Stage 1-3 COPD based on the Global Initiative for Chronic Obstructive Lung Disease (2020), diagnosis by a physician, and confirmation by spirometry testing indicating a post-bronchodilator ratio of FEV_1 to FVC <0.7; 2) Age: 40-80 years; 3) Ability to perform activities of daily living independently assessed by using the Chula Activities of Daily Living Index (Jitapunkul et al., 1994); 4) Cohabitation with the family caregivers; 5) Ability of participants or family caregivers to access the LINE application; 6) Willingness to participate in the program; 7) Ability to read and write the Thai language.

Furthermore, participants were excluded from participation if they had 1) Stress from life events such as the death of a spouse or other family member; 2) Comorbidities, including congestive heart failure, cancer, myocardial infarction, neurological disease, uncontrolled or severe psychosis, schizophrenia, or walking problems; 3) Unwillingness to participate in the study or other pulmonary rehabilitation; 4) Cognitive impairment, severe dementia, or severe Alzheimer's disease; 5) Visual or hearing impairment; 6) Hospitalization within four weeks before participating in this study.

The sample size was determined by using G*Power software (Version 3.1.9.4). In MANOVA, repeated measurements and within-between interaction were tested. The F-test of repeated measures was conducted three times. The sample size was determined by power analysis with a level of significance of 0.80 and an α value of 0.5. Prior studies have demonstrated that fatigue demonstrates an effect size of 0.33 (Mador & Modi, 2016). The G*Power software determined the total sample size required to be 92. However, considering the attrition rate potentially occurring based on previous

studies, which is 8% (Lin et al., 2019), an additional 10% was considered in calculating the total sample size. Therefore, the final sample size required was 102.

The experimental and control groups were assigned using stratified block randomization to adjust for age and disease severity. A computer-generated random number was used to build a randomization list. This study used block-of-four randomization to reduce the risk of predicting the next eligible participants' treatment assignment. The researcher was blind to the random number allocation; the research assistant sealed the package. The single-blind approach reduced the Hawthorne effect. The researcher did not inform individuals of the experimental or control group assignment. All individuals were randomly randomized to the experimental and control groups at 51 each (**Figure 1**). The researcher intervened for both groups at different times and locations.

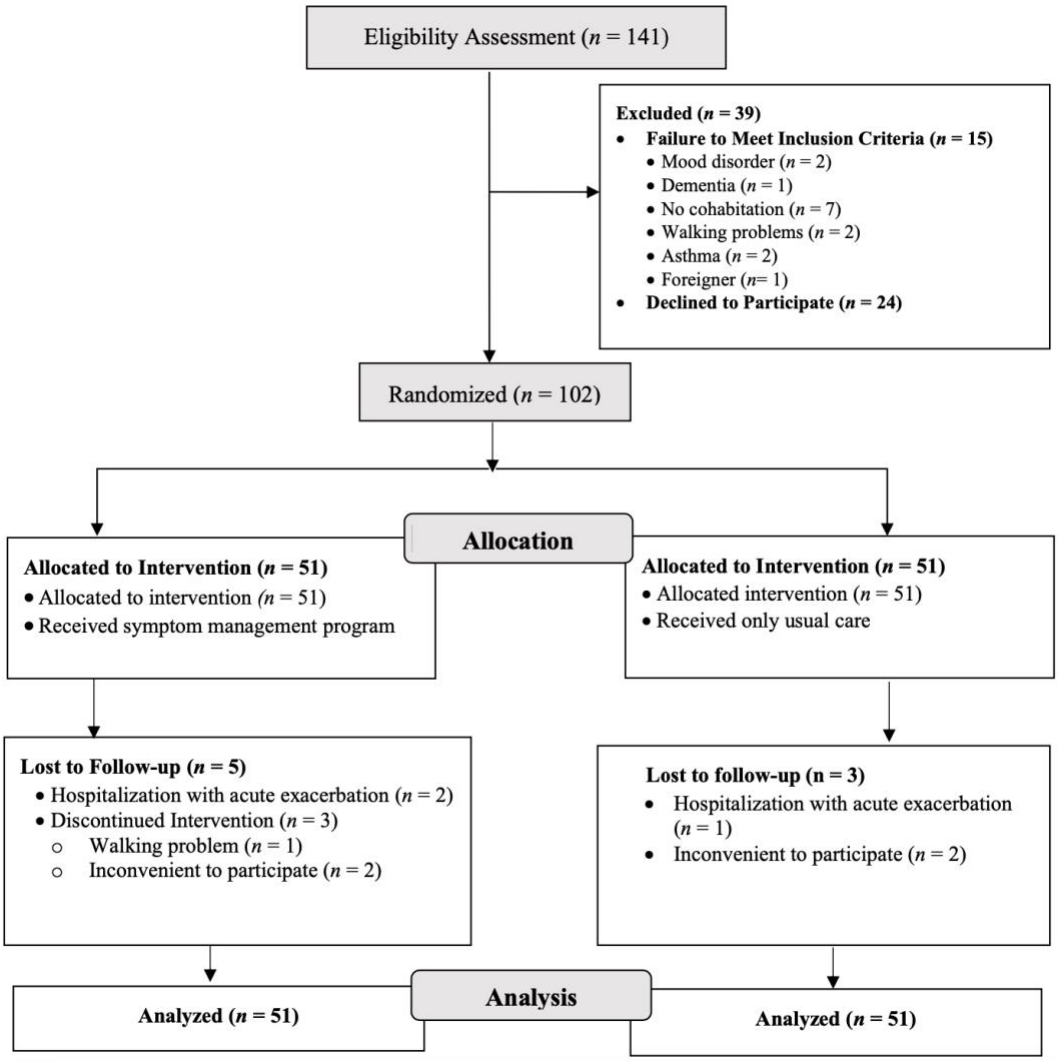

Figure 1 The CONSORT flow diagram of this study

Instruments

The study used three-part instrumentation as the following:

Part 1: The demographic and health history questionnaire included gender, age, marital status, occupation, primary caregiver, disease severity, disease duration, smoking status, comorbidities, and BMI.

Part 2: Perceived symptom experience consisted of five psychometric instruments as follows:

1) *The modified Medical Research Council (mMRC)* was used to evaluate dyspnea. It uses a 5-point scale from 0 to 4 (Mahler & Wells, 1988). The researcher sought authorization to use the Thai version of the Thoracic Society of Thailand under Royal Patronage, and the test-retest reliability, as measured by intraclass correlation coefficients, was determined to be 0.836.

2) *The Multidimensional Assessment of Fatigue (MAF)* scale comprises 16 items. This instrument uses a numerical rating scale (1 to 10), Items 1 and 4 to 14 (1 = not at all, 10 = a great deal); Item 2 (1 = mild to 10 = severe); and Item 3 (1 = no distress, 10 = a great deal of distress). Items 15 and 16 are categorical responses (1 to 4). Cronbach's alpha for the MAF in the Thai version is 0.891. The researcher asked for permission and used the Thai version from ePROVIDE™.

3) *The Pittsburgh Sleep Quality Index (PSQI)* evaluates subjective measures of sleep quality (Buysse et al., 1989). Each item is graded on a scale of 0 (no difficulty) to 3 (severe difficulty). The PSQI global score (range: 0-21) comprises all component scores, and a score greater than 5 indicates significant sleep disturbance. The internal consistency of the Thai-PSQI was determined by Cronbach's α 0.711. The

researcher asked Sitasuwan et al. (2014) for permission to use the Thai version.

4) *The Hospital Anxiety and Depression Scale (HADS)* is a 14-item scale comprising seven items for anxiety and depression subscales, respectively (Zigmond & Snaith, 1983). Each object is scored on a scale of 0 to 3. A subscale score greater than 8 indicates anxiety or depression (Nilchaikovit et al., 1996). The internal consistencies were determined with Cronbach's α values of 0.644 for anxiety and 0.624 for depression, and the intraclass correlation coefficient was 0.739. The researcher sought authorization to use the Thai version from the Department of Psychiatry, Faculty of Medicine, Ramathibodi Hospital, Mahidol University.

5) *The COPD Assessment Test (CAT)* can measure the global impact of COPD on patients' health status. Each item in the CAT has a 0-5 rating scale (Jones et al., 2009). Internal consistency was determined with Cronbach's α 0.659. The researcher requested authorization to utilize the Thai version of the GSK™.

Part 3: The 6-Minute Walk Test (6MWT) assessed physical function based on the American Thoracic Society guidelines (American Thoracic Society, 2002).

Interventions

The symptom management program was developed based on the theory of symptom management (Dodd et al., 2001) and a literature review. Symptom management theory states that symptom experience and symptom management strategies lead to symptom outcomes. The literature review found that self-care health education integrates information and advice from professionals and recognizes that knowledge can facilitate behavioral modifications (Global Initiative for Chronic Obstructive Lung Disease, 2020). The instructional programs align with the GOLD and ATS/ERS recommendations on pulmonary rehabilitation (Stoilkova et al., 2013). Daily walking with a pedometer and practicing walking meditation have been shown to alleviate symptoms and enhance physical function (Lin et al., 2019; Mendoza et al., 2015; Seetee et al., 2016). The program uses technology-based interventions to effectively monitor COPD symptoms and health problems, provide information, and help decision-making in managing and treating COPD symptoms at home. Utilizing technology-based interventions offers several advantages, such as a heightened level of physical activity, reduced risk for hospitalization, and enhancements in physical function and symptoms (Calvache-Mateo et al., 2021; Lundell et al., 2015). Family support is vital and must be integrated into this program to assist patients in managing their health conditions effectively (Chen et al., 2017). The symptom management program consists of two parts: Part One, symptom experience training, and Part Two, symptom management strategies.

Part One, known as symptom experience training, is the procedure to augment one's understanding and competence in perceiving, evaluating, and responding to symptoms (Bender et al., 2018). The researcher provides knowledge about factors influencing symptoms, engages in sharing experiences with patients, and enhances their capacity to perceive, evaluate, and effectively respond to symptoms and diseases.

Part two is symptom management strategies. The physical and psychological mechanisms (how) cover the strategy used. The researcher (who) provided the necessary knowledge in sleep hygiene, diet, energy conservation techniques, breathing techniques, and stress management (what) to the patients and family caregivers (to whom). The special training skills included Buddhist walking meditation and using a pedometer to promote physical activity. The researcher (who) monitored participants and encouraged family caregivers by telephone and video call to follow up every week (when). Engaging in an eight-week (how much) symptom management program at the COPD clinic and the participants' homes (where) improved symptom experience and physical function.

The details of the strategies are as follows: 1) the researcher delivered training on symptom experience and gave health education on self-care to the participants and family members on Day 1 of Week 1; 2) Discussion groups for exchanging symptom experiences and experiences with program activities were held at Week 4; 3) The practice of Buddhist walking meditation was performed at home three days a week. Each session involved three rounds of 10 minutes of walking and 10 minutes of rest. During the rest time, the participants performed a pursed-lip breathing exercise for five rounds, alternating with normal breathing for five rounds; 4) Use a pedometer to encourage daily walking, set goals for improving step counts, and daily recording in the books. The researchers chose a novel pedometer that had not been use before. This device has been proven to the trademark standard, ensuring accurate and valid tracking of all participants' daily activity. All participants were trained to use the same procedures in using this device; 5) Enlistment of family members to monitor, assist, and encourage participants to continue activities at home; 6) Telephone and video follow-up calls once a week at Weeks 2,3,5,6 and 7; 7) Resending of self-care health education video clips at Weeks 5-8.

Five experts verified the content validity of this intervention: 1) a physician expert in COPD; 2) a physical therapy instructor expert in COPD; 3) a sports science instructor expert in physical activity; 4) a nurse instructor expert in COPD, and 5) a nurse instructor expert in symptom management theory. The researcher tried out the revised program on five patients with characteristics similar to those of the sample in this study.

Data Collection

The researcher and four research assistants collected data from January 25, 2023, to August 9, 2023. One research assistant with a sports sciences background performed the 6MWT. The researcher prepared three research assistants for the techniques of conducting and gathering questionnaires before data collection. The research assistants asked the participants in both groups to answer the questionnaires and assess the 6MWT before beginning the intervention. Subsequently, the experimental group received the symptom management program with usual care, whereas the control group only received usual care. The research assistants measured the outcomes of the control and experimental groups throughout Weeks 4 and 8.

Data Analysis

The data were analyzed using the SPSS statistical software for Windows (Version 20.0). This study used an intention-to-

treat (ITT) analysis and descriptive statistics to analyze demographic and health history data. The *t*-test and Mann-Whitney U tests were employed to compare continuous variables, while Chi-Square and Fisher's Exact tests were used to compare categorical variables between the experimental and control groups at baseline. To determine the effects of the symptom management program on symptom experience and physical function, Repeated Measures MANOVA were employed to evaluate the hypotheses statistically. Before the analysis procedures, all relevant assumptions underwent comprehensive testing. The statistical significance level was set at a *p*-value of <0.05.

Ethical Considerations

The Human Research Ethics Committee of Thammasat University (Science), Thailand, approved this study (Reference COA No.111/2565). Additionally, the study was registered with The Thai Clinical Trials Registry on January 11, 2023 (TCTR 20230111006). The researcher ensured the protection of the participants' rights by explaining the research objectives, detailing the processes for data collecting, and outlining the expected benefits the research would bring to the participants and family caregivers. The researcher conveyed comprehensive details about the study through verbal explanations and gave out information sheets to ensure the participants were well-informed before obtaining written informed consent. The patients had the right to decline participation without adverse effects on healthcare service provision. This study protected the confidentiality and anonymity of participants throughout the study.

Results

Participants' Characteristics and Health History Data

The experimental and control groups had no significant differences in the baseline demographic and health history data (p >0.05). The majority of participants (76.50%) were categorized as older adults, while 93.10% identified as males. Most participants (80.40%) were categorized as being married, and 75.50% were actively engaged in agriculture. All participants remained in the care of their respective caregivers, and most primary caregivers consisted of spouses, who accounted for 56.86% of the total. Regarding the health history data, the participants had a median duration of COPD of 72 months, ranging from 36 to 120 months. The prevalence of disease severity among all patients was as follows: mild (43.20%), moderate (49.00%), and severe (7.80%). Most of the participants (84.40%) had previously ceased smoking, while 55.90% of the patients had no comorbidities and 44.10% had comorbidities. The study found hypertension (27.50%), diabetes mellitus (21.60%), and dyslipidemia (15.70%) as the three most prevalent comorbidities. Approximately 35.30% of the participants fell within the normal weight range based on BMI categories (**Table 1**).

Table 1 Demographic characteristics and health history data of the participants at baseline

Variables	Experimental group (*n* = 51)	Control Group (*n* = 51)	Total (*n* = 102)	*p*-value
	n (%)	*n* (%)	*n* (%)	
Gender				
Male	46 (90.20)	49 (96.10)	95 (93.10)	0.44[a]
Female	5 (9.80)	2 (3.90)	7 (6.90)	
Age				
40-59 years	12 (23.50)	12 (23.50)	24 (23.50)	0.60[b]
60-80 years	39 (76.50)	39 (76.50)	78 (76.50)	
Marital Status				
Single	2 (3.90)	2 (3.90)	4 (3.90)	0.55[c]
Married/Committed Relationship	43 (84.30)	39 (76.50)	82 (80.40)	
Divorced	6 (11.80)	10 (19.60)	16 (15.70)	
Occupation				
Agriculture	39 (76.50)	38 (74.50)	77 (75.50)	0.67[c]
Private-sector Employment	2 (3.90)	4 (7.80)	6 (5.90)	
Government-sector Employment	3 (5.90)	1 (2.00)	4 (3.90)	
Merchant	3 (5.90)	2 (3.90)	5 (4.90)	
None	4 (7.80)	6 (11.80)	10 (9.80)	
Primary Caregiver				
Spouse	33 (64.70)	27 (52.90)	60 (58.80)	0.13[c]
Child	13 (25.50)	18 (35.30)	31 (30.40)	
Nephew/Niece	1 (2.00)	3 (5.90)	4 (3.90)	
Sibling	0 (0.00)	2 (3.90)	2 (2.00)	
Other Relative(s)	4 (7.80)	1 (2.00)	5 (4.90)	
Disease Duration (months)				
Median (IQR)	72.00 (28-96)	72.00 (36-120)	72.00 (36-120)	0.62[d]
Disease Severity				
Mild	22 (43.20)	22 (43.20)	44 (43.20)	1.00[c]
Moderate	25 (49.00)	25 (49.00)	50 (49.00)	
Severe	4 (7.80)	4 (7.80)	8 (7.80)	
Smoking Status				
Former Smokers	39 (76.40)	47 (92.20)	86 (84.40)	0.09[c]
Never Smokers	6 (11.80)	2 (3.90)	8 (7.80)	
Current Smokers	6 (11.80)	2 (3.90)	8 (7.80)	

Table 1 *(Cont.)*

Comorbidities				
Yes	22 (43.10)	23 (45.10)	45 (44.10)	0.84[b]
No	29 (56.90)	28 (54.90)	57 (55.90)	
Hypertension	13 (25.50)	15 (29.40)	28 (27.50)	0.66[b]
Diabetes Mellitus	11 (21.60)	11 (21.60)	22 (21.60)	1.00[b]
Dyslipidemia	9 (17.60)	7 (13.70)	16 (15.70)	0.59[b]
Body Mass Index (BMI)				
Underweight (<18.5 kg/m^2)	6 (11.80)	8 (15.70)	14 (13.70)	0.82[b]
Normal Weight (18.5–22.9 kg/m^2)	20 (39.20)	16 (31.40)	36 (35.30)	
Overweight (23–24.9 kg/m^2)	10 (19.60)	13 (25.50)	23 (22.60)	
Obese (≥25 kg/m^2)	15 (29.40)	14 (27.40)	29 (28.40)	

Notes: a = Fisher's Exact test , b= Pearson chi-square (χ2), c = Likelihood ratio chi-square (χ2 LR), d = Mann-Whitney U test

Effects of the Symptom Management Program on Symptom Experience and Physical Function When Measured Over Time at Week 4 and Post-test at Week 8

The multivariate normality distribution, sphericity, linearity, and absence of multicollinearity were not violated. The homogeneity of variance was non-homogeneity of variance, and the homogeneity of variance-covariance matrices showed inequality across groups. Therefore, Pillai's Trace was used to analyze the repeated measure MANOVA. The results indicated that the symptom management program effectively influenced symptom experience and physical function in the experimental group when measured over time at Weeks 4 and 8 (F(14,87) = 5.257, *p* <0.001) (**Table 2**).

Table 2 Repeated measured MANOVA test between subjects and within subjects for dependent variables

Effect	Pillai's Trace	F	Hypothesis df	Error df	*p*	Partial Eta Square
Between Subjects						
Group	0.148	2.338	7	94	0.030*	0.148
Within Subjects						
Time	0.431	4.708	14	87	0.000**	0.431
Time*Group	0.458	5.257	14	87	0.000**	0.458

*Notes: **p*-value <0.001*, *p*-value <0.05

The interaction between the symptom management program and the duration of measures influenced the increase of the mean scores for the 6MWD (F = 26.947, *p* <0.001) and the decrease of the mean scores for the CAT (F = 7.262, *p* = 0.001), mMRC (F = 6.957, *p* = 0.001), MAF (F = 4.579, *p* = 0.011). However, compared to the control group, no significant statistics were observed in the PSQI, HADS-Anxiety, and HADS-Depression over time (**Table 3**).

Table 3 Univariate test for the mean scores difference of dependent variables within groups over repeated measures three times (baseline, Week 4, and Week 8) (*n* = 102)

Source	Variables	Mean Square	F	*p*	Partial Eta Square
Time* Group	6MWD	32428.721	26.947	0.000**	0.212
	CAT	1.993	7.262	0.001*	0.068
	mMRC	1.992	6.957	0.001*	0.065
	MAF	262.655	4.579	0.011*	0.044
	PSQI	3.991	0.805	0.448	0.008
	HADS-Anxiety	2.377	0.657	0.519	0.007
	HADS-Depression	1.063	0.324	0.723	0.003

*Notes: **p*-value <0.001, **p*-value <0.05

It was necessary to investigate the mean differences for each pair within each group using a post-hoc comparison test by Bonferroni. The experimental group had significant improvements in the mean scores for the mMRC and MAF compared to the scores before starting the program and better than the control group when measured over time at Weeks 4 and 8 (*p* <0.001, *p* <0.05). The experimental group had significantly increased the mean score for the 6MWD and had lower mean scores for the CAT than the control group at Week 8 (*p* <0.05), with improvement in the mean scores for the 6MWD and CAT at Weeks 4 and 8 (*p* <0.001, *p* <0.05). Although there were no significant differences in the mean PSQI scores between the experimental and control groups (*p* >0.05), the experimental group had a significantly lower mean PSQI score at Week 4 (*p* <0.05). There was a significant decrease in the mean HADS-Anxiety score between the experimental and control groups at Week 8 (*p* <0.05), and the mean HADS-Anxiety score decreased significantly at Week 8 (*p* <0.05). There was no statistically significant difference in the mean HADS-Depression score between the two groups during the study (*p* >0.05) (**Table 4**).

Table 4 Post-hoc comparison of the mean scores for dependent variables at different time points (baseline, Week 4, and Week 8) by time and group (n = 102)

Variables/ Time	Between Groups				Within Group (Bonferroni)		
	Group	Mean (SD)	F	*p*-value	Mean Difference		
					Time 1	Time 2	Time 3
6MWD							
Time 1	Experimental	329.27 (61.00)	3.619	0.060	-	-24.759**	-51.965**
	Control	354.64 (73.15)			-	-3.448	17.635
Time 2	Experimental	354.03 (55.50)	0.101	0.751	-	-	-27.206**
	Control	358.09 (72.41)			-	-	21.083
Time 3	Experimental	381.24 (58.39)	8.820	0.004*	-	-	-
	Control	337.01 (88.88)			-	-	-
CAT							
Time 1	Experimental	8.15 (5.09)	3.619	0.118	-	2.254*	4.600**
	Control	6.64 (4.55)			-	-0.788	0.843
Time 2	Experimental	5.90 (3.65)	2.090	0.151	-	-	2.346*
	Control	7.43 (6.62)			-	-	1.631
Time 3	Experimental	3.55 (2.55)	8.657	0.004*	-	-	-
	Control	5.80 (4.81)			-	-	-
mMRC							
Time 1	Experimental	0.72 (0.75)	0.066	0.797	-	0.321*	0.519**
	Control	0.68 (0.78)			-	-0.091	-0.014
Time 2	Experimental	0.40 (0.56)	6.634	0.011*	-	-	0.198*
	Control	0.77 (0.86)			-	-	0.078
Time 3	Experimental	0.20 (0.37)	21.193	0.000**	-	-	-
	Control	0.69 (0.66)			-	-	-
MAF							
Time 1	Experimental	16.86 (10.01)	0.005	0.944	-	6.597**	6.639**
	Control	17.00 (9.85)			-	0.572	1.711
Time 2	Experimental	10.26 (8.26)	12.158	0.001*	-	-	0.042
	Control	16.43 (9.54)			-	-	1.139
Time 3	Experimental	10.22 (7.62)	9.785	0.002*	-	-	-
	Control	15.29 (8.70)			-	-	-
PSQI							
Time 1	Experimental	6.15 (3.25)	0.300	0.585	-	0.921*	0.781
	Control	6.50 (3.24)			-	0.176	0.178
Time 2	Experimental	5.23 (3.07)	3.225	0.076	-	-	-0.140
	Control	6.33 (3.55)			-	-	0.001
Time 3	Experimental	5.37 (2.94)	2.189	0.142	-	-	-
	Control	6.33 (3.55)			-	-	-
HADS-Anxiety							
Time 1	Experimental	3.11 (2.46)	1.864	0.175	-	0.303	0.958*
	Control	3.86 (2.82)			-	0.346	0.452
Time 2	Experimental	2.81 (2.43)	1.998	0.161	-	-	0.655
	Control	3.51 (2.79)			-	-	0.532
Time 3	Experimental	2.15 (1.62)	6.476	0.012*	-	-	-
	Control	3.41 (3.11)			-	-	-
HADS-Depression							
Time 1	Experimental	2.58 (2.23)	1.958	0.165	-	0.276	0.673
	Control	3.29 (2.82)			-	0.276	1.075
Time 2	Experimental	2.44 (2.43)	1.215	0.273	-	-	0.532
	Control	3.01 (2.78)			-	-	0.798
Time 3	Experimental	1.91 (1.93)	0.630	0.429	-	-	-
	Control	2.21 (1.94)			-	-	-

*Notes: **p*-value <0.001, **p*-value <0.05

Discussion

The study findings indicate that the experimental group significantly improved over time in 6MWD, CAT, mMRC, and MAF scores compared to the control group. However, there were no statistically significant differences found over time in the PSQI, HADS-Anxiety, and HADS-Depression scores when comparing the experimental and control groups. The experimental group's results showed significant improvements in the mean scores for the mMRC and MAF before starting the program, and they were better than those of the control group when measured over time at Weeks 4 and 8. The experimental group had a significantly increased mean score for the 6MWD and a lower mean score for the CAT than the control group at Week 8, with improvement in the mean scores for the 6MWD and CAT at Weeks 4 and 8.

The symptom management program in this study consisted of two components: symptom experience training and symptom management strategy. The first component is symptom-experience training, which assists participants in

learning about COPD symptoms and sharing experiences, which helps the patients to have more confidence in detecting abnormalities within their bodies compared to the past. In addition to developing confidence and the ability to notice symptoms quickly, participants were able to decide whether to seek family help or medical care.

Symptom management strategies include self-care health education and skill training, walking meditation, encouragement of family support, and technology-based intervention consisting of the LINE official account, video clips, and pedometers to encourage daily walking as wearable technology. These strategies improve individual awareness, allow well-informed decision-making, and provide appropriate coping techniques for complex symptom management. Buddhist walking meditation integrates both corporeal and cognitive components, enabling practitioners to direct their attention toward the motion of lower limbs during ambulation, thus facilitating a state of deep and sustained mindfulness (Srisoongnern et al., 2021). Pursed lip breathing assists in prolonging airway opening, thereby releasing trapped air inside the respiratory system by decreasing the respiratory rate and alleviating dyspnea (Vatwani, 2019). Implementing the LINE application, telephone calls, and video call follow-ups enabled the researcher to monitor patients more effectively and enhanced the interactions between patients and families, allowing them to access information about self-care and address any questions they may have from the comfort of home. Real-time feedback from the pedometer assisted patients in optimizing the patients' daily actions to meet set physical activity goals. Family support is essential in helping individuals confront health difficulties and managing the symptoms encountered.

The results of this study in the mMRC and 6MWD are congruent with Seetee et al. (2016), who implemented a pulmonary rehabilitation program combined with walking meditation conducted for eight weeks, with each session lasting 20 minutes. The results demonstrated the importance of the 6MWD and reduced dyspnea in Weeks 4 and 8 when scores were lower than at the baseline (Seetee et al., 2016). The Minimal Clinical Difference (MCID) of the 6MWD is 30 meters (Holland et al., 2014). The study found that a higher percentage of patients in the experimental group (68.62%) achieved the MCID for the 6MWD, compared to only 20.00% in the control group. Additionally, the minimum change in the mMRC score is considered significant, which was determined to be a decrease of 0.5 points (Oliveira et al., 2017). It was indicated that the experimental group exhibited a more significant proportion of patients who achieved the MCID for the mMRC, with 43.13% in the experimental group compared to 25.49% in the control group.

For the CAT scores, the experimental group exhibited a notable reduction in the mean score for the CAT in comparison to the control group by Week 8. Additionally, the experimental group enhanced the mean scores of CAT at Weeks 4 and 8, mirroring an 8-week treatment regimen involving regular Tai Chi Chun practice significantly improved pulmonary symptoms, as measured by CAT, among patients with COPD (Shen et al., 2022). Moreover, the MCID for the CAT can be calculated as a reduction of 2 points (Kon et al., 2014). The findings of this study indicate that 56.86% of the patients in the experimental group achieved the MCID in contrast to 37.25% in the control group.

Regarding the fatigue variable, the experimental group had significant improvements in the mean scores for the MAF before starting the program and better scores than the control group when measured over time at Weeks 4 and 8, which is consistent with a systematic review that examined the programs of endurance training activities had a range of durations lasting 6 to 24 weeks. The results indicated that various exercise training programs benefit subjective fatigue in patients with COPD (Paneroni et al., 2020).

Furthermore, the experimental group's results significantly improved over time in the 6MWD and mMRC compared to the control group, while the PSQI, HADS-Anxiety, and HADS-Depression had no significant differences in the mean PSQI scores between the experimental and control groups. These results are consistent with a study by Gabrovska et al. (2023) that examined the impact of 30 group sessions of pulmonary rehabilitation conducted three times a week. The 6MWD and dyspnea showed improvement. However, the PSQI score and sleep efficiency assessed by angiography showed no change, and the scores for anxiety and depression did not demonstrate any change.

In the present study, for the experimental group, there was a statistically significant difference in the PSQI score at Week 4 and a statistically significant difference in the HADS-Anxiety score at Week 8 compared to the baseline data. There was a significant decrease in the mean HADS-Anxiety score between the experimental and control groups at Week 8. However, there was no statistically effective improvement in depression symptoms at all points of time measurement. The above results showed that the symptom management program does not clearly affect sleep disturbance, anxiety, and depression. These may be because 1) the scores of anxiety and depression were in the normal range at baseline.; 2) the symptom management program takes at least eight weeks to affect anxiety.; and 3) there are interrelated associations among the symptoms of sleep disturbance, anxiety, and depression.

In addition, there are many factors influencing sleep disturbance. These factors include pathophysiology in COPD, climate change, and the COVID-19 situation. COPD leads to an imbalance between the ability to handle respiratory demands and the respiratory effort during wakefulness and sleep, caused mainly by expiratory flow limitation (D'Cruz et al., 2020). Sleep is connected to various changes in respiratory physiology. These include the absence of external factors affecting the drive to breathe, disruption of the balance between air and blood flow, leading to low oxygen levels and high carbon dioxide levels with reduced activity of muscles involved in rapid eye movement sleep (McNicholas et al., 2019). The complicated mechanism of the disease impacts sleep.

The climatic changes influence sleep patterns, anxiety, and depression. Weather and season, which are uncontrollable, affect sleep quality and patterns. Between 2020 and 2029, climate change is expected to raise heat stress by 0.1 °C to 4 °C in Thailand (Amnuaylojaroen et al., 2022). During the data collection period, the northeastern region of Thailand undergoes an extended period of hot weather, with temperatures soaring up to 40 °C

(Thanyalakmrtha, 2022). The summer season is significantly associated with later bedtimes, earlier awakening, and an average increase of 3.5 hours in daylight compared to winter (Mattingly et al., 2021). Higher daily or nighttime temperatures are negatively associated with sleep quality and quantity worldwide (Chevance et al., 2024). This study hypothesized that weather conditions and temperature may have influenced the sleep disturbance experienced by patients with COPD in the study. This hypothesis was based on the observation that the temperature was high, and the air was stuffy with high humidity.

The COVID-19 situation could impact psychological symptoms in COPD. Patients are susceptible to COVID-19 infection, likely to suffer severe complications, and are subject to strict lockdown strategies, which encourage them to isolate themselves. Furthermore, patients have high perceived stress linked with COVID-19, post-traumatic stress, depression, and insomnia (Pedrozo-Pupo & Campo-Arias, 2020).

The above factors may influence the perception of depressive symptoms in COPD. A correlation has been observed between the disease severity and the occurrence of symptoms related to depression and anxiety in patients who have COPD (Akalu et al., 2020; Negi et al., 2014). In the present study, 7.80% of patients displayed severe disease severity, representing a small subgroup of participants. Moreover, it is essential to highlight that the symptoms of anxiety and depression may resemble other symptoms associated with COPD (Yohannes & Alexopoulos, 2014). The participants might have been unreliable in detecting and differentiating symptoms of depression since there were overlapping symptoms and other possible symptoms. There is evidence indicating that the pathophysiology of COPD, the COVID-19 pandemic, climate change, disease severity, and overlapping symptoms can affect the symptoms of sleep disturbance, anxiety, and depression in patients with COPD. Hence, it is crucial to apply a symptom management program for patients with COPD across all levels of disease severity. However, further research should involve the development of comprehensive programs for managing symptoms with the specific goal of efficiently managing sleep disturbances, anxiety, and depressive symptoms. Furthermore, it would be interesting to study in diverse environments and at different public health service facility levels, encompassing settings such as hospitals and metropolitan districts.

Implications for Nursing Practice

The strength of this study was that the activities in this program were straightforward, easy to perform, and feasible for participants in remote areas within the Thai cultural context. Thus, the findings support the feasibility and acceptability of an intervention that is relatable to people of Thai and Buddhist cultures. Implementation of the symptom management program provided comprehensive knowledge and training to patients on the perception, evaluation, responses, and management of symptoms, starting at the initial phase of patient diagnosis. Patients can learn and have independent experiences, assess symptoms independently, and be assisted in choosing suitable strategies for symptom management. Nurses can implement the symptom management program into their usual nursing care in clinics specializing in COPD.

Moreover, a notable aspect of this study was implementing practical activities specifically tailored for patients with COPD residing in remote areas. Hence, nurses can employ mindfulness interventions, walking strategies, mobile health technology, or wearable technology to improve physical function and alleviate symptoms in patients with COPD. Promoting accurate and appropriate information about the disease and symptom management among patients and caregivers is crucial in developing informed strategies for self-care and medical treatment in Thailand and worldwide.

Limitations and Recommendations

The findings of this study have limited generalizability. These results can be applicable in populations with similar contexts and treatments. The symptom management intervention studied in this trial has potential applicability in populations and regions for whom a community-based, Buddhist-related approach to symptom management approach is both feasible and acceptable. The recommendation for future studies is to incorporate comprehensive symptom management strategies that effectively address sleep disturbances, anxiety, and depressive symptoms in people with COPD. Furthermore, studies on the effectiveness of the symptom management program on clinical outcomes in diverse settings and at several public health service facility levels encompassing varied contexts would be interesting.

Conclusion

Our study demonstrated that completing an eight-week symptom management program by providing comprehensive knowledge and skill training, enhancing physical activity through Buddhist walking meditation combined with pursed-lip and daily walking, involvement of family support, and using technology-based intervention can improve dyspnea, fatigue, CAT scores and increase 6MWD scores in adults with COPD. Consequently, nurses should establish a symptom management program to improve the management of symptoms and preserve physical function, decreasing patients' reliance on family members and enhancing the quality of life for adults with COPD.

Declaration of Conflicting Interest

The authors declared no conflicts of interest in this study.

Funding

This study is the dissertation for the Ph.D. in Nursing Science program at the Faculty of Nursing, Thammasat University. The researcher received a scholarship from Mahasarakham University. This study had no external funding.

Acknowledgment

The authors would like to thank Mahasarakham University, Thammasat University, Borabue Hospital, all participants, and family members who willingly participated in this study.

Authors' Contributions

The first author (AK) contributed to the literature review, research design, sample selection, data collection, data analysis, and initial manuscript writing. The second author (TH) and the third author (EJ) contributed to the study's conceptualization, methodology, research, formal analysis, and critical analysis. All authors obtained responsibility for each research step and approved the publication of the final version.

Authors' Biographies

Apinya Kochamat, MNS., RN, is a Ph.D. Candidate at the Faculty of Nursing, Thammasat University, Pathum Thani, Thailand.

Teeranut Harnirattisai, Ph.D., RN, is an Associate Professor at the Faculty of Nursing, Thammasat University, Pathum Thani, Thailand.

Evanne Juratovac, Ph.D., APRN, GCNS-BC, is an Assistant Professor at the Frances Payne Bolton School of Nursing and the Department of Psychiatry, School of Medicine at Case Western Reserve University, Cleveland, Ohio, USA. She is also a Faculty Associate at the University Center on Aging and Health at the same institution.

Data Availability

The datasets during the study are not publicly available due to privacy and confidentiality concerns.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

References

Akalu, Y., Mossie, A., & Tadesse, S. (2020). Depression, anxiety and stress among COPD patients: A comparative cross sectional study. *Journal of Depression and Anxiety*, *9*(3), 1-12.

American Thoracic Society. (2002). ATS Statement: Guidelines for the Six-Minute Walk Test. *American Journal of Respiratory and Critical Care Medicine*, *166*(1), 111-117. https://doi.org/10.1164/ajrccm.166.1.at1102

Amnuaylojaroen, T., Limsakul, A., Kirtsaeng, S., Parasin, N., & Surapipith, V. (2022). Effect of the near-future climate change under RCP8. 5 on the heat stress and associated work performance in Thailand. *Atmosphere*, *13*(2), 325. https://doi.org/10.3390/atmos13020325

Bender, M. S., Janson, S. L., Franck, L. S., & Lee, K. A. (2018). Theory of symptom management. In M. J. Smith & P. R. Liehr (Eds.), *Middle range theory for nursing* (pp. 147-178). Springer Publishing Company.

Bentsen, S. B., Gundersen, D., Assmus, J., Bringsvor, H., & Berland, A. (2013). Multiple symptoms in patients with chronic obstructive pulmonary disease in Norway. *Nursing & Health Sciences*, *15*(3), 292-299. https://doi.org/10.1111/nhs.12031

Boers, E., Barrett, M., Su, J. G., Benjafield, A. V., Sinha, S., Kaye, L., Zar, H. J., Vuong, V., Tellez, D., & Gondalia, R. (2023). Global burden of chronic obstructive pulmonary disease through 2050. *JAMA Network Open*, *6*(12), e2346598. https://doi.org/10.1001/jamanetworkopen.2023.46598

Buysse, D. J., Reynolds, C. F., 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*, *28*(2), 193-213. https://doi.org/10.1016/0165-1781(89)90047-4

Calvache-Mateo, A., Lopez-Lopez, L., Heredia-Ciuro, A., Martin-Nunez, J., Rodriguez-Torres, J., Ortiz-Rubio, A., & Valenza, M. C. (2021). Efficacy of web-based supportive interventions in quality of life in COPD patients, a systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, *18*(23), 12692. https://doi.org/10.3390/ijerph182312692

Chen, Z., Fan, V. S., Belza, B., Pike, K., & Nguyen, H. Q. (2017). Association between social support and self-care behaviors in adults with chronic obstructive pulmonary disease. *Annals of the American Thoracic Society*, *14*(9), 1419-1427. https://doi.org/10.1513/AnnalsATS.201701-026OC

Chevance, G., Minor, K., Vielma, C., Campi, E., O'Callaghan-Gordo, C., Basagaña, X., Ballester, J., & Bernard, P. (2024). A systematic review of ambient heat and sleep in a warming climate. *Sleep Medicine Reviews*, 101915. https://doi.org/10.1016/j.smrv.2024.101915

D'Cruz, R. F., Murphy, P. B., & Kaltsakas, G. (2020). Sleep disordered breathing and chronic obstructive pulmonary disease: A narrative review on classification, pathophysiology and clinical outcomes. *Journal of Thoracic Disease*, *12*(Suppl 2), S202-S216. https://doi.org/10.21037%2Fjtd-cus-2020-006

Dodd, M., Janson, S., Facione, N., Faucett, J., Froelicher, E. S., Humphreys, J., Lee, K., Miaskowski, C., Puntillo, K., & Rankin, S. (2001). Advancing the science of symptom management. *Journal of Advanced Nursing*, *33*(5), 668-676. https://doi.org/10.1046/j.1365-2648.2001.01697.x

Gabrovska, M., Herpeux, A., Bruyneel, A.-V., & Bruyneel, M. (2023). Pulmonary rehabilitation improves sleep efficiency measured by actigraphy in poorly sleeping COPD patients. *Scientific Reports*, *13*(1), 11333. https://doi.org/10.1038/s41598-023-38546-3

Global Initiative for Chronic Obstructive Lung Disease. (2020). *Global strategy for chronic obstructive pulmonary disease*. https://goldcopd.org/wp-content/uploads/2019/12/GOLD-2020-FINAL-ver1.2-03Dec19_WMV.pdf

Holland, A. E., Spruit, M. A., Troosters, T., Puhan, M. A., Pepin, V., Saey, D., McCormack, M. C., Carlin, B. W., Sciurba, F. C., & Pitta, F. (2014). An official European Respiratory Society/American Thoracic Society technical standard: Field walking tests in chronic respiratory disease. *European Respiratory Journal*, *44*(6), 1428-1446. https://doi.org/10.1183/09031936.00150314

Jitapunkul, S., Kamolratanakul, P., & Ebrahim, S. (1994). The meaning of activities of daily living in a Thai elderly population: Development of a new index. *Age and Ageing*, *23*(2), 97-101. https://doi.org/10.1093/ageing/23.2.97

Jones, P. W., Harding, G., Berry, P., Wiklund, I., Chen, W. H., & Leidy, N. K. (2009). Development and first validation of the COPD Assessment Test. *European Respiratory Journal*, *34*(3), 648-654. https://doi.org/10.1183/09031936.00102509

Kon, S. S. C., Canavan, J. L., Jones, S. E., Nolan, C. M., Clark, A. L., Dickson, M. J., Haselden, B. M., Polkey, M. I., & Man, W. D. C. (2014). Minimum clinically important difference for the COPD Assessment Test: A prospective analysis. *The Lancet Respiratory Medicine*, *2*(3), 195-203. https://doi.org/10.1016/S2213-2600(14)70001-3

Lee, J., Nguyen, H. Q., Jarrett, M. E., Mitchell, P. H., Pike, K. C., & Fan, V. S. (2018). Effect of symptoms on physical performance in COPD. *Heart & Lung*, *47*(2), 149-156. https://doi.org/10.1016/j.hrtlng.2017.12.007

Lin, F.-L., & Yeh, M.-L. (2021). Walking and mindfulness improve the exercise capacity of patients with chronic obstructive pulmonary disease: A randomised controlled trial. *Clinical Rehabilitation*, *35*(8), 1117-1125. https://doi.org/10.1177/0269215521992917

Lin, F. L., Yeh, M. L., Lai, Y. H., Lin, K. C., Yu, C. J., & Chang, J. S. (2019). Two-month breathing-based walking improves anxiety, depression, dyspnoea and quality of life in chronic obstructive pulmonary disease: A randomised controlled study. *Journal of Clinical Nursing*, *28*(19-20), 3632-3640. https://doi.org/10.1111/jocn.14960

Long, H., Li, S., & Chen, Y. (2023). Digital health in chronic obstructive pulmonary disease. *Chronic Diseases and Translational Medicine*, *9*(2), 90-103. https://doi.org/10.1002/cdt3.68

Lundell, S., Holmner, Å., Rehn, B., Nyberg, A., & Wadell, K. (2015). Telehealthcare in COPD: A systematic review and meta-analysis on physical outcomes and dyspnea. *Respiratory Medicine*, *109*(1), 11-26. https://doi.org/10.1016/j.rmed.2014.10.008

Mador, M. J., & Modi, K. (2016). Comparing various exercise tests for assessing the response to pulmonary rehabilitation in patients with COPD. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *36*(2), 132-139. https://doi.org/10.1097/HCR.0000000000000154

Mahler, D. A., & Wells, C. K. (1988). Evaluation of clinical methods for rating dyspnea. *Chest*, *93*(3), 580-586. https://doi.org/10.1378/chest.93.3.580

Marques, A., Gabriel, R., Jácome, C., Cruz, J., Brooks, D., & Figueiredo, D. (2015). Development of a family-based pulmonary rehabilitation programme: An exploratory study. *Disability and Rehabilitation*, *37*(15), 1340-1346. https://doi.org/10.3109/09638288.2014.964376

Mathews, A. M. (2023). The functional and psychosocial consequences of COPD. *Respiratory Care*, *68*(7), 914-926. https://doi.org/10.4187/respcare.10542

Mattingly, S. M., Grover, T., Martinez, G. J., Aledavood, T., Robles-Granda, P., Nies, K., Striegel, A., & Mark, G. (2021). The effects of seasons and weather on sleep patterns measured through longitudinal multimodal sensing. *NPJ Digital Medicine*, *4*(1), 76. https://doi.org/10.1038/s41746-021-00435-2

McNicholas, W. T., Hansson, D., Schiza, S., & Grote, L. (2019). Sleep in chronic respiratory disease: COPD and hypoventilation disorders. *European Respiratory Review*, *28*(153), 190064. https://doi.org/10.1183/16000617.0064-2019

Mendoza, L., Horta, P., Espinoza, J., Aguilera, M., Balmaceda, N., Castro, A., Ruiz, M., Díaz, O., & Hopkinson, N. S. (2015). Pedometers to enhance physical activity in COPD: A randomised controlled trial. *European Respiratory Journal*, *45*(2), 347-354. https://doi.org/10.1183/09031936.00084514

Miaskowski, C., Dodd, M., & Lee, K. (2004). Symptom clusters: The new frontier in symptom management research. *JNCI Monographs*, *2004*(32), 17-21. https://doi.org/10.1093/jncimonographs/lgh023

Negi, H., Sarkar, M., Raval, A. D., Pandey, K., & Das, P. (2014). Presence of depression & its risk factors in patients with chronic obstructive pulmonary disease. *Indian Journal of Medical Research*, *139*(3), 402-408.

Nilchaikovit, T., Lotrakul, M., & Phisansuthideth, U. (1996). Development of Thai version of hospital anxiety and depression scale in cancer patients. *Journal of the Psychiatric Association of Thailand*, *4*, 18-30.

Oliveira, A. L. A., Andrade, L., & Marques, A. (2017). Minimal clinically important difference and predictive validity of the mMRC and mBorg in acute exacerbations of COPD. *European Respiratory Journal*, *50*, PA4705. https://doi.org/10.1183/1393003.congress-2017.PA4705

Paneroni, M., Vitacca, M., Venturelli, M., Simonelli, C., Bertacchini, L., Scalvini, S., Schena, F., & Ambrosino, N. (2020). The impact of exercise training on fatigue in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis. *Pulmonology*, *26*(5), 304-313. https://doi.org/10.1016/j.pulmoe.2020.02.004

Pedrozo-Pupo, J. C., & Campo-Arias, A. (2020). Depression, perceived stress related to COVID, post-traumatic stress, and insomnia among asthma and COPD patients during the COVID-19 pandemic. *Chronic Respiratory Disease*, *17*, 1479973120962800. https://doi.org/10.1177/1479973120962800

Reishtein, J. L. (2005). Relationship between symptoms and functional performance in COPD. *Research in Nursing & Health*, *28*(1), 39-47. https://doi.org/10.1002/nur.20054

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomised trials. *BMC Medicine*, *8*, 18. https://doi.org/10.1186/1741-7015-8-18

Seetee, S., Terathongkum, S., Maneesriwongul, W., & Vallipakorn, S. A.-O. (2016). Effect of pulmonary rehabilitation program with meditation on perceived self-efficacy, pulmonary rehabilitation behavior, exercise tolerance, and dyspnea in patients with chronic obstructive pulmonary disease. *Journal of the Medical Association of Thailand*, *99*(7), 828-838.

Shen, H., Chen, L.-Z., Hu, Z., Yao, X., Yang, T., Zhang, L., Tu, Q., Li, G., & Wei, G.-X. (2022). Integrating chronic obstructive pulmonary disease treatment with 8-week Tai Chi Chuan practice: An exploration of mind-body intervention and neural mechanism. *Frontiers in Human Neuroscience*, *16*, 849481. https://doi.org/10.3389/fnhum.2022.849481

Sitasuwan, T., Bussaratid, S., Ruttanaumpawan, P., & Chotinaiwattarakul, W. (2014). Reliability and validity of the Thai version of the Pittsburgh Sleep Quality Index. *Journal of the Medical Association of Thailand 97*(Suppl 3), S57-S67.

Spruit, M. A., Singh, S. J., Garvey, C., ZuWallack, R., Nici, L., Rochester, C., Hill, K., Holland, A. E., Lareau, S. C., & Man, W. D. C. (2013). An official American Thoracic Society/European Respiratory Society statement: Key concepts and advances in pulmonary rehabilitation. *American Journal of Respiratory and Critical Care Medicine*, *188*(8), e13-e64. https://doi.org/10.1164/rccm.201309-1634ST

Srisoongnern, S., Pajareya, K., Sriboon, R., Thanakiatpinyo, T., Chirakarnjanakorn, S., & Thirapatarapong, W. (2021). Effects of Buddhist walking meditation on exercise capacity and quality of life of patients with chronic heart failure: A randomized controlled trial. *Heart & Lung*, *50*(3), 363-368. https://doi.org/10.1016/j.hrtlng.2021.02.005

Stoilkova, A., Janssen, D. J. A., & Wouters, E. F. M. (2013). Educational programmes in COPD management interventions: A systematic review. *Respiratory Medicine*, *107*(11), 1637-1650. https://doi.org/10.1016/j.rmed.2013.08.006

Thanyalakmrtha, S. (2022). *Thailand Country Report 2022*. Ministry of Interior. https://www.adrc.asia/countryreport/THA/2022/Thailand_CR_FY2022.pdf

Vatwani, A. (2019). Pursed lip breathing exercise to reduce shortness of breath. *Archives of Physical Medicine and Rehabilitation*, *100*(1), 189-190. https://doi.org/10.1016/j.apmr.2018.05.005

Yohannes, A. M., & Alexopoulos, G. S. (2014). Depression and anxiety in patients with COPD. *European Respiratory Review*, *23*(133), 345-349. https://doi.org/10.1183/09059180.00007813

Zhang, P., Samartkit, N., & Masingboon, K. (2023). Factors associated with health-related quality of life among employed individuals with chronic obstructive pulmonary disease: A correlational study in China. *Belitung Nursing Journal*, *9*(3), 271-279. https://doi.org/10.33546%2Fbnj.2654

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*(6), 361-370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

Cite this article: Kochamat, A., Harnirattisai, T., & Juratovac, E. (2024). The effects of a symptom management program on symptom experience and physical function in Thai adults with chronic obstructive pulmonary disease: A single-blind randomized controlled trial study. *Belitung Nursing Journal, 10*(4), 378-388. https://doi.org/10.33546/bnj.3393