Sakarya Üniversitesi Holistik Sağlık Dergisi
Sakarya University Journal of Holistic Health

ISSN : 2687-6078
Publisher : Sakarya University

Vol. 7, No. 2, 94-112, 2024
DOI: https://doi.org/10.54803/sauhsd.1435079

Research Article

Dyspnea, Care Dependency, and Frailty in Older Adults with Chronic Obstructive Pulmonary Disease: A Correlational Study

Merve Çakıcı[1], Zehra Gök Metin[2*]

[1] Ankara Medipol University, Health Sciences Faculty, Department of Nursing, Ankara, Türkiye, merve.cakici@ankaramedipol.edu.tr

[2] Hacettepe University, Nursing Faculty, Medical Nursing Department, Ankara, Turkiye zehra.gok@hacettepe.edu.tr

*Corresponding Author

Abstract

Objective: As chronic obstructive pulmonary disease (COPD) progresses, older adults have an increased symptom burden, including severe dyspnea. The present study aimed to investigate the relationship between dyspnea, care dependency, and frailty in older adults with COPD.

Methods: The current study was a descriptive-correlational study. One hundred and five participants were included. Data were collected face-to-face using the Dyspnea-12 Scale, Care Dependency Scale, and Edmonton Frailty Scale. Correlation and regression analysis were performed.

Results: The median score for dyspnea was 24 (moderate to high), 61 (low) for care dependency, and 10 (moderate) for frailty. Age (β=0.171, p=.013), COPD stage (β=0.465, p<.001), and income status (β=0.907, p=.049) were the predictors of dyspnea and explained 67.1% of the variance. Age (β=-0.43, p<.001), COPD stage (β = 0.506, p<0.001), and income status (β=- 0.147, p<.001) were also identified as the predictors of care dependency. Besides age and COPD stage, educational status (β=0.172, p<.049) were the predictors of frailty.

Conclusions: This study implied that older adults who had advanced stage COPD, were lower educated, had low-income levels, and comorbidities perceived higher care dependency and frailty. Nurses should assess both dyspnea and care dependency to identify older adults with COPD at risk for increased frailty. Studies considering COPD stage, education level, income status, and comorbidities on dyspnea management, and alleviating care dependency and frailty are warranted.

Keywords: Care Dependency, Chronic Obstructive Pulmonary Disease, Dyspnea, Frailty, Older Adults, Nurse

Received: 11.02.2024
Accepted: 24.07.2024
Available Online: 19.08.2024

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable chronic disease with a high prevalence, associated with progressive airflow obstruction that interferes with normal breathing and is responsible for serious morbidity and mortality worldwide (1). World Health Organization has announced that more than three million people die from COPD each year worldwide (2). COPD is also the fourth most common cause of death in Türkiye (3).

Recent clinical and cellular evidence has shown that accelerated (lung) aging is a significant predisposing factor for the development of COPD. COPD brings breathing difficulty, cough, mucus (sputum) production and wheezing due to a common inflammatory cascade and causes comorbidities including muscle wasting, osteoporosis, lung cancer, cardiovascular diseases, and metabolic disorders (4). Nutrition problems, anxiety, and depression that trigger frailty are also common in older adults with COPD (5). As COPD progresses, older adults have a higher symptom burden including fatigue, coughing,

Cite as: Çakıcı M., Gök Metin Z. Dyspnea, Care Dependency, and Frailty in Older Adults with Chronic Obstructive Pulmonary Disease: A Correlational Study. *Sakarya Üniversitesi Holistik Sağlık Dergisi*. 2024;7(2): 94-112. https://doi.org/10.54803/sauhsd.1435079

sputum production, weakness in muscles, loss of appetite, anxiety, depression, sleep disturbance, and shortness of breath or severe dyspnea (6).

Considering the relationship between advanced age and COPD, and the trend toward aging in the world (7), it is crucial to address potential factors that may influence increasing symptom burden, care-related problems, and frailty syndrome, and develop comprehensive disease management, self-care or self-efficacy programs to alleviate COPD burden among the older population (8). Both physical symptoms such as dyspnea, fatigue, cough, increased sputum production, anorexia, weight loss, and cognitive and psychosocial symptoms including weakening in cognitive functions, attention changes, anxiety, and depression among adults with COPD restrict individuals' daily living activities, also deteriorates the health, well-being, and quality of life (9, 10). The most prominent symptom in adults with COPD is chronic and progressive dyspnea, which initially appears with heavy effort, but becomes evident over time even with mild or low effort (11,12). The increase in the severity of dyspnea should be considered as an indicator of poor prognosis for COPD (13). Severe dyspnea, especially during exercise and in acute exacerbation reduces the physical activities of adults who can perform independently, causes them to get assistance from family members even in self-care, and thus brings care dependency problems (14).

COPD with progressive decline in pulmonary function and acute exacerbations plays a facilitating role in frailty, which is one of the important geriatric syndromes in older adults, in addition to the severe symptom burden and increasing care needs, as well as care dependency (15, 16). Frailty is defined as the depletion of reserves in many systems in the human body and increased sensitivity to external stresses, including all negative health consequences such as reduced physiological reserves due to age, decreased body mass index, weakness, slowness, lower physical activity, stress intolerance, and burnout (17, 18). The risk of progress frailty has risen in older adults with chronic lung disease, for COPD (frailty 50.3%, prefrailty 35.3%) compared with those without chronic lung problems (19, 20). Multiple factors including lower pulmonary function, severe dyspnea, poorer exercise capacity, diminished quality of life and higher mortality may contribute to the deepening of frailty in adults with chronic lung disease. Roughly, one in five people with COPD is estimated to experience frailty (21, 22). Frailty and COPD are associated with common risk factors including aging, increased chronic inflammation, endocrine dysfunctions, and smoking (1, 10). The onset of COPD symptoms after the age of 40 and the increase in repeated hospitalizations, together with the increase in exacerbations at later ages, may make older individuals more vulnerable. Besides, adults with COPD constitute a risky population for frailty in terms of accompanying common symptoms such as refractory dyspnea, fatigue, anorexia, exercise intolerance, reduced walking distance, muscle weakness, and balance problems (23, 24). Frailty independently predicts many health-related adverse outcomes, including frequent hospitalizations, longer hospital stays, and increased mortality, and is related to higher symptom burdens both physical and psychological (22).

The literature confirms that the severity of dyspnea is an important factor in daily living, functional capacity, quality of life, and disease stage in adults with COPD (25). Limited studies pointed out the importance of care dependency and frailty in the COPD population (15, 16). Although COPD is an important cause of mortality and morbidity, no study has focused on care dependency in older adults with COPD, and few studies have compared care dependency levels in adults with COPD and other chronic conditions (25, 26). Jannsen et al. (2014) compared the changes in care dependency over one-year among adults with advanced COPD, heart failure, and chronic renal failure, and specified that older adults, who experienced frequent hospitalizations, had higher comorbidities, and were diagnosed with advanced COPD had an increased risk of care dependency (25). Unlike this study, Köberich et al. (2014) reported no difference in levels of care dependency among adults with COPD and heart failure (26). However, there have been no studies that address dyspnea, care dependency, and frailty levels in a specific sample that included only older adults with COPD, simultaneously. Moving from this literature gap, this study aimed to determine sociodemographic and clinical characteristics that may have an

impact on dyspnea, care dependency, and frailty, and define the relationship between these three variables in older adults with COPD. Following research questions were developed:
How socio-demographic and clinical features may affect dyspnea, care dependency, and frailty in older adults with COPD?
What is the correlation between dyspnea, care dependency, and frailty in older adults with COPD?

2. Methods

2.1. Study design

This study had a descriptive-correlational design.

2.2. Participants and sampling

The participants were older adults with COPD. A convenience sampling was used to recruit participants. Eligibility criteria were as follows: (1) being literate, (2) being older than 65 years, (3) having stage I-IV COPD according to the GOLD 2020 criteria, (4) not having a cognitive and communication problems, and (5) being volunteered to participate in the study. Participants were excluded if they (1) were admitted to emergency or intensive care units with a COPD exacerbation during the study, and (2) refused to participate.
G Power 3.1.9.4 software program was utilized to determine the sample size (27). Estimating the correlation coefficient value between the Dyspnea-12 Scale and the Care Dependency Scale as 0.50, the sample size was determined to be at least 105 older adults in the study with 0.90 power and 0.05 margin of error (28). A total of 150 older people were evaluated for eligibility criteria during the study,. Among those, illiterate (n=30), under 65 years (n=5), had cognitive problems (n=5), and refused to participate (n =5) were excluded. Finally, 105 older participants with COPD were included (Fig. 1).

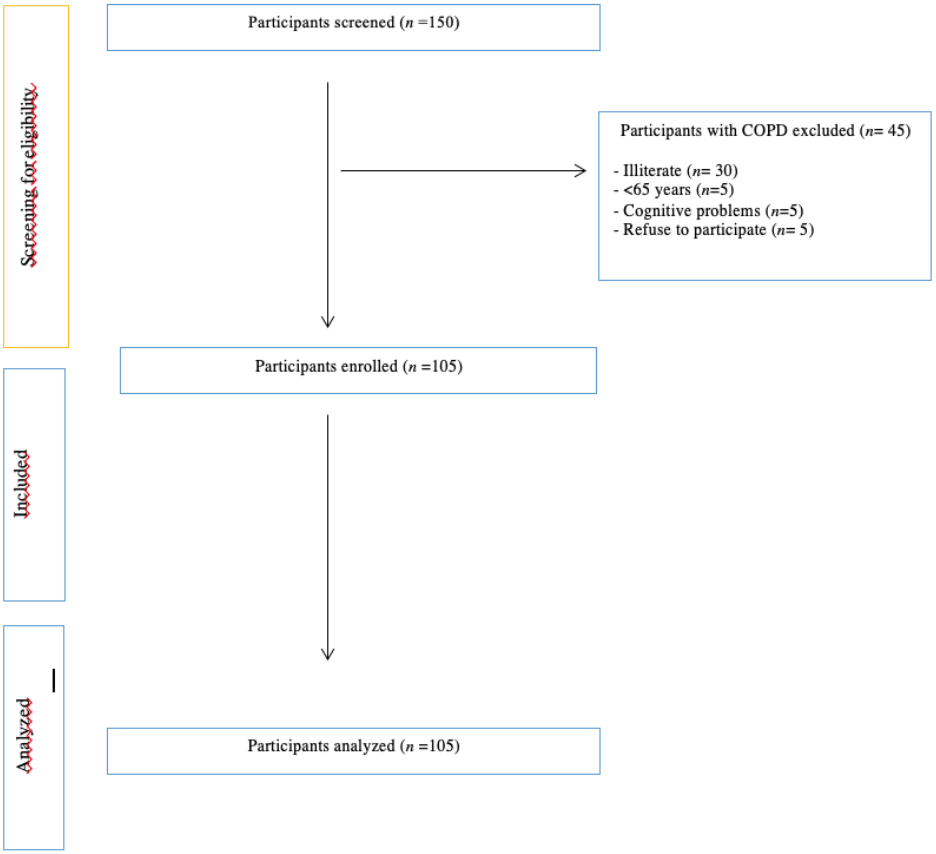

Figure 1. Flow Diagram of the Study Sample

2.3. Data Collection

Data were collected between October 1, 2019, and April 1, 2020, from three different centers: The Chest Diseases Clinic of Gazi University Health Research and Application Center, the Internal Medicine Clinics of Hacettepe University Adult Hospital, and the Chest Diseases Clinics and Outpatient Clinics of Health Sciences University Gulhane Training and Research Hospital. The questionnaires were applied face-to-face. It took approximately 30 min for each participant to complete all the instruments.

2.4. Measurements

2.4.1. Patient information form

This form was developed based on the relevant literature (6, 9, 10), and included nine questions: age, gender, marital status, educational level, employment status, income status, COPD stage, comorbidities, and the number of medications used.

2.4.2. Dyspnea-12 scale

The scale is a 12-item tool developed to evaluate the multidimensional aspects of dyspnea (28). The scale has two sub-dimensions: physical (1-7 items) and emotional (8-12 items). The physical sub-dimension of the scale includes items such as my breathing does not go in all the way, my breathing takes more effort, I fell short of breath, I have difficulty catching my breath, etc. Regarding the emotional sub-dimension, the scale includes the following items: my breathing makes me feel depressed, my breathing makes me feel miserable, my breathing is distressing, my breathing makes me agitated, and my breathing is irritating are placed on the scale. The scale items are scored on a four-point Likert scale described as “0=none”, “1=mild”, “2=moderate”, and “3=severe”. The total score ranges from 0 to 36, with higher scores indicating higher levels of dyspnea. Gok Metin and Helvaci (2018) investigated the Turkish reliability and validity of the scale, reporting the Cronbach's alpha value to be 0.97, and the test-retest reliability to be 0.94 (29). In the present study, Cronbach’s alpha value wascalculated to be 0.97.

2.4.3. Care dependency scale

The scale was developed by Dijkstra et al. (1998) based on Virginia Henderson’s Basic Human Needs (30) and helps to assess the care dependency level regarding eating, mobility, incontinence, body temperature, drinking, dressing, body posture, day/night pattern, undressing, hygiene, communication contact with others, daily activities, recreational activities, avoidance of danger, etc. among people with chronic diseases. Yönt et al. (2010) (31) conducted its’ Turkish reliability and validity, the Cronbach’s alpha value was reported as 0.91. The Turkish version includes 17 items, and two new items are cognitive abilities and worship. Each item is scored on a five-point Likert scale ranging from “1=complete dependency” to “5=complete independence.” The total scores of the scale may vary between 17 and 85. Lower scores indicate that people are completely dependent on care, higher scores mean that people are almost independent of care. The Cronbach’s alpha value was calculated as 0.91 in this study.

2.4.4. Edmonton frailty scale

Rolfson et al. (2006) (32) developed the Edmonton Frailty Scale, and the internal consistency of this scale was reported as 0.62. The Edmonton Frailty Scale measures a total of nine domains of frailty including general health status, nutrition, cognition, mood, functional performance, medication use, social support, functional independence, and continence. Total scores on the scale can range from 0 to 17. The participants are classified into five categories, with higher scores meaning higher frailty. According to the Edmonton Frailty Scale, 0 to 4 points are categorized as “not frail.” Those with 5 to 6 points are categorized as “vulnerable;” those who score 7 to 8 points are categorized as “mild.” At 9 to 10 points, their condition is “moderate,” and at 11 to 17 points, their condition is “severe”. The Turkish

validity and reliability of the scale was performed by Aygör et al. (2018) and Cronbach's alpha value was 0.75 (33). The Cronbach's alpha value was found as 0.75 in the current study.

2.5. Data analysis

SPSS IBM 25.0 software (IBM Corp., Chicago, IL, USA) was used for data analysis. Descriptive statistics were utilized to present the socio-demographics and clinical characteristics of older adults. Chi-square analysis was used to assess the associations between categorical variables. The Shapiro-Wilks test, Kolmogorov-Smirnov test, and the graphical test were used to check compliance with normal distribution. As dyspnea, care dependency, and frailty scores were not normally distributed, the median, first, and third quartiles were presented. Group differences were defined based on Mann-Whitney U (two groups), or Kruskal Wallis (more than two groups). Pairwise comparisons with Bonferroni correction were applied if there was a significant difference between more than two groups. The Spearman correlation test was used to measure the correlation between the Dyspnea-12, Care Dependency Scale, and Edmonton Frailty Scale scores. p values <0.05 were accepted as statistically significant.

The multiple regression model was carried out to examine the effect of socio-demographic and clinical characteristics on dyspnea, care dependency, and frailty. Total Dyspnea-12, Care Dependency Scale, and Edmonton Frailty Scale scores were used as dependent variables in the linear regression model. Age (categorized as 65-70 and >70 years), COPD stage, educational status (university vs high school), income status (middle vs high), comorbidities (hyperlipidemia vs coronary artery disease), and treatment for other comorbidities (present (yes)-not present (no) were modeled as independent variables. In multivariate analysis, variables found to be statistically significant were included in the regression model. Subsequently, separate analyses were carried out for Dyspnea-12, Care Dependency, and Edmonton Frailty Scales.

2.6. Ethical considerations

Hacettepe University Non-Interventional Clinical Research Ethics Committee (Approval Number: GO 19/841, 2019/20-57, Approval date: 03.09.2019) approved the study. The institutional permissions were obtained from all study settings. The study aim was explained to each participant, and verbal and written informed consent was obtained. Participants were clearly informed that they could withdraw from the study at any point in time without stating a reason. They were informed that there was no cost to participate in this study. The study adhered to the tenets of the Declaration of Helsinki. Information including name and participant identification number was not requested to preserve anonymity, and each participant was given a unique code to ensure confidentiality. The authors obtained permission for all utilized scales, which were validated for the Turkish population.

3. Results

The mean age was 73.71(SD=6.17) years, and most of the participants were male (59%), married (79%), retired (65.7%), had primary school graduates (75.2%), and 56.2% of those had moderate income. Considering smoking status, 11.4% of participants were current smokers and the vast majority (61.9%) of them were former smokers. 86.7% of them had comorbidities, and those were frequently listed as hypertension (59%), diabetes mellitus (41%), coronary artery disease (37.1%), asthma (15.2%), and hyperlipidemia (15.2%) (Table 1). The vast majority (45.7%) of the participants were diagnosed with stage II COPD and most of them (94.3%) were receiving COPD treatments. COPD treatments were Beta-2 agonists (51.4%), anticholinergics (41%), combined inhalers (34.3%), corticosteroids (27.6%), and methyl xanthine (12.4%) (Table 1).

Table 1. Participants' Characteristics (n=105)

Characteristic		
Age (year) (Mean, SD)[a-]	73.71, 6.17	
	n	**%**
Age		
65-70	38	36.2
71+	67	63.8
Gender		
Female	43	41.0
Male	62	59.0
Marital status		
Married	83	79.0
Single	22	21.0
Educational status		
Primary school	79	75.2
High school	21	20.0
University	5	4.8
Working status		
Employed	1	1.0
Unemployed	35	33.3
Retired	69	65.7
Income status		
Low	45	42.8
Middle	59	56.2
High	1	1.0
Smoking status		
Current smoker	12	11.4
Former smoker	64	61.0
Never smoked	29	27.6
Pack-years		
1-20	1	8.3
21-40	6	50.0
41-60	5	41.7
Co-morbidities		
Yes	91	86.7
No	14	13.3
HT	62	59.0
CAD	39	37.1
DM	43	41.0
Asthma	16	15.2
HL	16	15.2
Others	45	42.9
GOLD stage		
Stage I	9	8.6
Stage II	48	45.7
Stage III	29	27.6
Stage IV	19	18.1
Use of treatments		
Yes	99	94.3
No	6	5.7

Beta-2 agonists	54	51.4
Anticholinergics	43	41.0
Combine inhaler	36	34.3
Steroids	29	27.6
Methylxanthine	13	12.4

[a]SD, Standard deviation. [b] Valid percentage. [c]n folded.
Abbreviation: DM, Diabetes Mellitus, CAD, Coronary Artery Disease, GOLD, Global Obstructive Lung Disease, HT, Hypertension, HL, Hyperlipidemia, 25.p, 25. Percentage, 75.p 75. Percentage, CI, Confidence interval.

The median scores of the Dyspnea-12 Scale were 24 (moderate to high), 14 for the physical subscale, and 10 for the emotional subscale. A positive, and moderate correlation was found between age and the Dyspnea-12 Scale scores (r=0.561, p<.05; Table 2).

In univariate analyses, according to the characteristics of the participants, a statistically significant difference was found between age, marital status, educational level, employment status, income level, COPD stage, presence of comorbid conditions, and the total number of treatments used for other comorbid conditions in terms of Dyspnea-12 scores (p<.05). By analyzing the tolerance and variance inflation factor (VIF), the multicollinearity of the independent variables was tested. The tolerance was above 0.1 and the VIF was below 10 (1.079-1.197), confirming the absence of multicollinearity. The Durbin-Watson statistic of the multiple regression model was 1.463, confirming the absence of correlations among the residuals. The regression model was statistically significant (F=43.390, p<.001), and age (β=0.171, p=.013), COPD stage (β=0.465, p<.001), and income status (β=.907, p=.049) were identified as the predictors of dyspnea and these variables explained 67.1% of the variance (Table 5).

The median scores of the Care Dependency Scale were found to be 61, at a low level. No significant difference was found between gender, employment status, smoking, cigarette pack/year, and medication use for COPD and the Care Dependency Scale scores (p>.05; Table 3). A strong and negative correlation was also found between age and Care Dependency Scale scores (r=-0.716; p<.05; Table 3). According to univariate analyses, a significant difference was observed between age, marital status, educational level, income status, COPD stage, the total number of drugs used per day, and Care Dependency Scale scores (Table 5, p<.05). The regression model was statistically significant (F=57.824, p<.001), and age (β=-0.43, p<.001), COPD stage (β=0.506, p<.001), and income status (β=- 0.147, p<.001) were identified as the predictors of care dependency and these variables explained 68.6% of the variance. When comparing the age groups 65-70 and over 70, the Care Dependency Scale score of participants over the age of 70 is 12.996 points lower than that of the 65-70 age group (Table 5).

Table 2. Comparison of Dyspnea-12 Scale Scores by Sample Characteristics (n=105)

Characteristic	Physical Sub-scale (25.p-75.p)	Test statistics	p	Emotional sub-scale (25.p-75.p)	Test statistics	p	Dyspnea-12 Scale (25.p-75.p)	Test statistics	p	Difference
Age(year) (Mean, SD)[a]		0.540[b]	***.001***		0.516[b]	***.001***		0.561[b]	***<.001***	
Gender										
Female	14 (12-18)	1077.5[c]	.093	8 (5-11)	1071.5[c]	0.85	21(18-29)	1072.000[c]	.88	-
Male	15 (13-21)			10 (7-15)			26 (19-33)			
Marital status										
Married	14 (12-19)	556.00[c]	***.005***	9 (5-11)	579.0[c]	***.008***	23 (18-30)	552.500[c]	***.004***	2-1
Single	19 (14-21)			11.5 (10-15)			32 (24-36)			
Educational status										
Primary school	15 (13-20)	9.720[d]	***.008***	10 (7-14)	13.029[d]	***.001***	24 (19-33)	13.025[d]	***.001***	1-2,3
High school	13(10-15)			5 (5-10)			18(15-24)			
University	7 (7-14)			5 (3-6)			12(10-19)			
Working status										
Employed	7 (7-7)	892.5[c]	***.029***	1 (1-1)	962.5[c]	.008	8 (8-8)	911.00[c]	***.041***	3-2
Unemployed	14 (12-15)			8 (5-10)			21(17-36)			
Retired	15 (13-21)			10 (6-15)			25 (19-35)			
Income status										
Low	16 (14-21)	873.0[c]	***0.03***	10 (8-15)	868.0[c]	***.002***	26 (23-36)	820.0[c]	***.001***	
Middle	13 (11-18)			7 (5-11)			20 (17-30)			1-2
High[e]	21 (21-21)			12 (12-12)			33 (33-33)			
Smoking status										
Smoked	14 (13-20)	0.128[d]	.938	9 (7-14)	0.074[d]	.963	24 (19-35)	0.148[d]	.929	-
Never smoked	14 (12.5-20)			10 (4.5-13.5)			24(18-32)			
Former smoker	14 (12.5-18.5)			10 (5-12)			24(18-32)			
Pack-years										
1-20[e]	57 (48-68)	12.0[c]	.662	15 (15-15)	11.5[c]	.537	36 (36-36)	12.0[c]	.662	-
21-40	63 (57-74)			6.5 (4-11)			21(16-30)			
41-60	61 (51-79)			10 (10-12)			24 (24-24)			

COPD stage									
Stage I	7 (6-9)	64.889[d]	***<.001***	3 (0-7)	53.443[d]	***<.001***	12 (7-14)	63.016[d]	***<.001***	1-3
Stage II	13 (12-14)			7 (5-10)			20 (17-24)			1-4
Stage III	20 (15-21)			11(10-15)			30 (26-36)			2-3
Stage IV	21(19-21)			15 (15-15)			36 (33-36)			2-4
Comorbidities									
Yes	14 (13-21)	289.5[c]	***<.001***	10 (6-14)	300.5[d]	***.001***	24 (19-34)	276.0[c]	***.001***	1-2
No	12.5 (9-13)			5 (5-8)			18 (14-20)			
COPD treatment									
Yes	14 (13-20)	93.0[d]	.147	10 (5-14)	234.0[d]	.379	24 (18-33)	204.0[c]	.197	-
No	13.5 (9-14)			8 (6-10)			21.5 (15-24)			
Treatment for other comorbidities									
Yes	15 (13-21)	1311.00[c]	.885	10 (6-15)	1260.0[c]	.631	24 (19-34)	1330.5[c]	.987	-
No	12 (9-13)			5(4-8)			18 (14-19)			
Number of drugs used per day									
1-3	14 (12-16)	4.306[d]	.116	8 (5-10)	8.657 [d]	0.13	21(17-29)	6.778 [d]	***.034***	2-1
4-5	16.5 (13.5-21)			11 (9.5-15)			26(23-36)			
6 and over	18 (13-21)			10 (7-12)			29(18-33)			

[a] SD, Standard deviation, [b] Spearman correlation test value, [c] Mann Whitney U test value, [d] Kruskal Wallis test value, [e] Only one participant in the group, [*]*p*<.05, 25.p, 25. Percentage, 75.p 75. Percentage, CI, Confidence interval.

Table 3. Comparison of Care Dependency Scale Scores by Sample Characteristics (n=105)

Characteristic	Median (25.p-75.p)	Test statistic	p	Difference
Age (year) (Mean, SD)[a]	73.71, 6.17	-0.716[b]	***.001***	**-**
Gender				
Female	65 (52-78)	1186.500[c]	.340	-
Male	58 (51-76)			
Marital status				
Married	65 (52-79)	660.500[c]	***<.047***	-
Single	54 (47-62)			
Educational status				
Primary school	57 (46-68)	20.071[d]	***<.001***	1-2
High School	78 (57-83)			
University	81 (79-84)			
Working status				
Employed	81 (81-81)	1198.500[c]	.951	-
Unemployed	61 (53-73)			
Retired	59 (50-79)			
Income status				
Low	57 (44-68)	859.500[c]	***<.002***	1-2
Middle	65 (53-82)			
High[e]	52 (52-52)			
Smoking status				
Never smoked	57 (48-68)	1.598[d]	.450	-
Current Smoker	63 (57-74)			
Former smoker	61 (51-79)			
Pack-years				
1-20[e]	60 (60-60)	11.000[c]	.537	-
21-40	69 (56-80)			
41-60	59 (58-68)			
COPD stage				
Stage I	81 (76-83)	55.928[d]	***<.001***	1-3
Stage II	73 (61-82)			1-4
Stage III	54 (47-87)			2-3
Stage IV	45 (37-52)			2-4
Co-morbidities				
Yes	57 (48-73)	190.500[c]	***<.001***	-
No	82 (76-83)			
COPD treatment				
Yes	60 (50-76)	219.500[c]	.284	-
No	66.50 (57-81)			
Treatment for other co-morbidities				
Yes	57 (48-70)	118.00[c]	***<.001***	-
No	82 (80-83)			
Number of drugs				
1-3	66 (56-76)	11.414[c]	***<.003***	2-1
4-5	54 (43-62)			
6 and over	54 (47-75)			

[a]SD, Standard deviation, [b]Spearman correlation test value, [c] Mann Whitney U test value, [d] Kruskal Wallis test value, [e]Only one participant in the group, 25.p, 25. Percentage, 75.p 75. Percentage, CI, Confidence interval.

Table 4. Comparison of Edmonton Frailty Scale Scores by Sample Characteristics (n=105)

Characteristic	Median (25.p-75.p)	Test Statistic	p	Difference
Age (year) (Mean, SD)[a]		0.659[b]	***<.001***	**-**
Gender[c]				
Female	10 (7-12)	1157.000[c]	.250	-
Male	11(7-13)			
Marital status[c]				
Married	10 (6-12)	571.000[c]	***<.007***	1-2
Single	12 (10-13)			
Educational status				
Primary school	11(8-13)	22.831[d]	***<.001***	1-2,3
High school	6 (4-10)			
University	2 (2-3)			
Working status				
Employed	2(2-2)	1077.500[d]	0.369	-
Unemployed	10(7-12)			
Retired	10(7-13)			
Income status				
Low	11(9-13)	791.500[c]	***<.001***	1-2
Middle	9 (4-12)			
High	12 (12-12)			
Smoking status				
Never Smoked	11(10-13)	2.900[d]	.0235	-
Current smoker	10 (7-12)			
Ex-smoker	10 (6-12)			
Pack-years				
1-20	11(11-11)	12.500[d]	.662	-
21-40	11 (5-13)			
41-60	8 (8-10)			
GOLD stage				
Stage I	4 (3-7)	60.110[d]	***<.001***	1,2-3,4
Stage II	8 (5-10)			
Stage III	12 (11-13)			
Stage IV	13 (11-14)			
Co-morbidities[c]				
Yes	11(8-13)	178.000[c]	***<.001***	1-2
No	4 (4-5)			
COPD treatment[c]				
Yes	10 (7-13)	1203.500[c]	*.264*	-
No	8 (7-10)			
Treatment for other co-morbidities[c]				
Yes	11 (8-13)	189.500[c]	***<.001***	1-2
No	4 (3-6)			
Number of drugs (per day)				
1-3	8 (6-11)	16.989[d]	***<.001***	2-1
4-5	12 (10-14)			
6 and over	11 (9-13)			

[a]SD standard deviation, [b] Spearman correlation test value, [c] Mann Whitney U test value, [d] Kruskal Wallis test value.
GOLD, Global Obstructive Lung Diseases, 25.p, 25. Percentage, 75.p 75. Percentage, CI, Confidence interval.

The median Edmonton Frailty Scale score was 10 (moderate). While 45.7% of the participants were severely frail, and 15.3% were not frail. According to univariate analyses, a statistically significant difference was found between age, marital status, educational status, income status, COPD stage, presence of comorbidities, treatment for other comorbid conditions, total number of medications taken per day, and the Edmonton Frailty Scale scores (Table 4; p<.05). The regression model was statistically

significant (F = 37.157, p<.001), and age (β = 0.229, p<.002), COPD stage (β = 0.462, p<.001), educational status (β =0.172, p<.011), comorbid conditions (β =0.172, p<.011), and treatment for other comorbid conditions (β =0.126, p<.049) were identified as the predictors of frailty and these variables explained 67.6% of the variance. Considering the standardized beta coefficients, the most significant independent variable on the Edmonton Frailty Scale total score is stage IV COPD, and the least significant one is treatments used for comorbid conditions (Table 5).

Table 5. Multiple Regression Model for Predictors of Dyspnea, Dare Dependency, and Frailty (n=105)

Independent variables	**Dyspnea-12 Total Scores**					
	Beta	**SE**	**Std. Beta**	**Lower 95% CI**	**Upper 95% CI**	**p**
Age	0.231	0.092	0.171	0.049	0.413	**0.013**
COPD stage						
Stage II (ref. Stage I)	7.712	1.906	0.465	3.929	11.495	***<.001***
Stage III (ref. Stage I)	15.621	2.111	0.848	11.430	19.811	***<.001***
Stage IV (ref. Stage I)	19.399	2.229	0.907	0.049	0.413	***<.001***
Income status						
Middle-high (ref. low)	1.989	1.000	0.119	0.005	3.972	***.049***
Adjusted R^2 = 0.671 F= 43.390, ***p<.001***						
Independent variables	**CDS Total Scores**					
	Beta	**SE**	**Std. Beta**	**Lower 95% CI**	**Upper 95% CI**	**p**
Age						
>70 (ref. 65-70)	12.996	1.989	-0.403	-16.941	-9.051	***<.001***
COPD stage						
Stage III (ref. Stage I)	-12.094	2.187	-0.349	-16.432	-7.756	***<.001***
Stage IV (ref. Stage I)	-20.393	2.454	-0.506	-25.261	-15.525	***<.001***
Income status						
Middle-high (ref. low)	-6.511	2.729	-0.147	-11.926	-1.097	***<.019***
Adjusted R^2 = 0.686 F= 57.824, ***p<.001***						
Independent variables	**EFS Total Scores**					
	Beta	**SE**	**Std. Beta**	**Lower 95% CI**	**Upper 95% CI**	**p**
Age						
>70 (ref. 65-70)	1.768	0.546	0.229	0.684	2.851	***.002***
COPD stage						
Stage III (ref. Stage I)	3.682	0.531	0.444	2.627	4.736	***<.001***
Stage IV (ref. Stage I)	4.454	0.598	0.462	3.267	5.641	***<.001***
Educational status						
Primary school (ref. university and high school)	1.479	0.572	0.172	0.343	2.615	***<.011***
Comorbidities						
Co-morbid conditions (ref. no comorbid condition) HL	1.526	0.572	0.172	0.343	2.615	***<.011***
Treatment for other comorbidities						
Using treatments for other co-morbid conditions (ref. any)	1.339	0.673	0.126	0.003	2.675	***.049***
Adjusted R^2 = 0.676 F= 37.157, ***p<.001***						

GOLD, Global Obstructive Lung Disease, SE, Standard Error. Generalized stepwise regression model, not normal distribution with identity link. ref, referent CAD, Coronary Artery Disease, HL, Hyperlipidemia, CI, Confidence interval.

A negative and strong correlation was found between dyspnea and care dependency (r=-0.754, p<0.05). A positive and strong correlation was determined between dyspnea and frailty (r=0.765, p<0.05). Care

dependency and frailty scores have showed a negative, and very strong correlation (r=-0.838, p<0.05, Fig. 2).

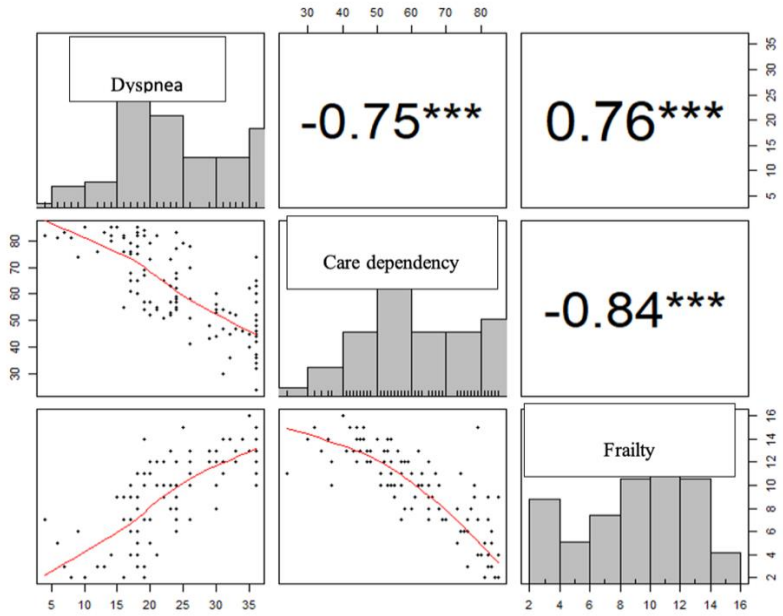

Figure 2. The Correlation Between Dyspnea, Care Dependency, and Frailty Scores

4. Discussion

This study identified factors affecting sociodemographic and clinical variables dyspnea, care dependency, and frailty in older adults with COPD. As a result, the dyspnea, and care dependency were seen as influenced by age, COPD stage, and income status, while care dependency was affected by age, COPD stage, educational status, comorbid conditions, and used treatments for comorbid conditions.
Chronic and progressive dyspnea experienced by individuals with COPD reduces the number of activities performed independently and leads to care dependency (34, 35). Therefore, it is important to evaluate the impact of dyspnea on the lives of people with COPD in a multidimensional approach. In our study, the Dyspena-12 scale scores were found as 24 (moderate-high). Like our findings, the mean scores of the Dyspena-12 scale were reported to be 18, and 26 in two recent studies conducted on the COPD population (35, 36). It is reported that variables such as age, gender, health status, comorbidities, decreased FEV1 value, COPD stage, and smoking status may affect the perceived severity of dyspnea in COPD (12). Confirming previous reports, our findings in the multivariate analyses showed a significant difference between variables including age, advanced stage of COPD, presence of comorbidities, lower income, and the severity of dyspnea. In this study, age, COPD stage, and income status explained 67.1% of the change in the Dyspena-12 scale total score. Our findings stated that an increase of >15 points in the Dyspena-12 scale total score of participants with stage III-IV COPD in the multivariable analyses, which is the estimated significant clinically important difference.

In parallel with our findings, Sharma et al. (2019) (12) reported a significant, and positive correlation between age, the severity of dyspnea, and health status, and emphasized that the severity of dyspnea and the health status worsened in older adults with COPD. The authors assumed that this finding may be associated with the fact that older adults with COPD those who have higher dyspnea severity, either do not work or have low income due to retirement, and they cannot benefit from healthcare opportunities effectively, and generally cannot fully control their disease symptoms, and meet their self-care needs. Discovering additional factors related to dyspnea severity and designing new clinical interventions for better symptom management in older adults may be helpful.

As mentioned earlier, people with COPD experience limitations while performing their daily living activities, have difficulty, and are highly dependent on other people, and their dependency levels vary

with the interaction of multiple factors (37, 38). Age, COPD stage, educational status, income level, presence of comorbid conditions, and the number of treatments used are reported as affecting factors for care dependency (26, 37, 38). Türk and Üstün (2018) (38), and Janssen et al. (2014) (25) identified that care dependency is associated with the increasing age of people with COPD. In our study, the level of care dependency increased as the age increased. Especially, advanced statistical analysis showed that care dependency increased among people older than 70 years compared with adults aged 65-70 years in this study. Considering these findings, it can be inferred that advanced age may be the main predictor for an increase in care dependency in older adults with COPD.

Previous reports have also highlighted a significant association between lower educational status, lower income level, and higher care dependency level (37-39). In line with the literature, care dependency was significantly higher in older adults with stage III and IV COPD (decrease of <12 points), who received treatment for comorbidities (decrease of < 6 points) in our study (26, 37, 38). The authors assume that as the majority of older adults with COPD had primary school graduates and had a low-income level in this study, an individual's knowledge about COPD and its management, used treatments, exacerbations, and symptom reduction may not be sufficient, all of these may lead to a decrease in treatment adherence, and inadequate financial status may negatively affect the situation regarding daily life and self-care and leading to an increase in care dependency.

Our analyses indicated that older adults with COPD had low care dependency scores, however, those with advanced-stage COPD, other comorbidities in addition to COPD, and were using a higher number of treatments had significantly higher care dependency scores. Furthermore, age, stage III-IV COPD, and treatments used for comorbid conditions seem to be significant predictors in care dependency among older adults considering correlational and regression model analysis, and these variables explained a total variance of 68.6% of care dependency scores. Previous studies published similar results that care dependency increased with the progression of the COPD stage (37, 39). Kara (2019) also reported that individuals who continuously received treatments for chronic diseases were more dependent than those who did not receive treatments (37). Khdour et al. (2009) emphasized that medication management problems negatively affected daily life, functional status, and quality of life in people with COPD (40). The lower level of care dependency in our study may be related to the fact that the participants (45.7%) were diagnosed with stage II COPD. However, our results also indicated that care dependency may increase due to conditions such as comorbidities and polypharmacy with the aging process and that higher symptom burden is associated with worse general and disease-specific health status in COPD. Furthermore, inadequate knowledge about the use and management of COPD treatments due to the low education level, increase in drug-drug interactions with aging, changes in cognitive level, cognitive problems, living alone, nutritional deficiencies, increased vulnerability, and lack of self-care may also increase the level of care dependency and emphasizes the importance of addressing symptom burden in the older population with COPD again.

With the aging of the world's population, an important problem that we encounter is the frailty syndrome. Chronic diseases are among the important risk factors for frailty (16, 17). Due to its increasing prevalence in older individuals, COPD is likewise an important risk factor for frailty (17). Uchmanowicz et al. (2016) (41) found that 75% of the participants with COPD were frail. Galizia et al. (2011) (42) investigating the effect of frailty on mortality in people with and without COPD with a 12-year follow-up reported that frailty increased the mortality rate from 41.5% to 75.1% in people without COPD and from 54.3% to 97% in people with COPD. Bernabeu-Mora et al. (2017) (22) reported that 18.4% of adults with COPD were severely frail and 44.7% were vulnerable to repeated hospitalizations within 90 days after hospitalization following acute exacerbations of COPD. It is striking that 45.7% of older participants with COPD in our study were also severely frail and our results revealed a higher level of frailty than the previous studies. Age, advanced stage of COPD, lower educational status,

comorbidities, and medication use were the main predictors of care dependency in older adults with COPD, and these variables explained 0.67% of the change in care dependency scores of our sample. The differences in these findings may result from advanced-stage of COPD, nutritional problems, the severity of dyspnea, comorbidities, polypharmacy, limitations in physical activity, and all the physiological changes that may occur in old age.

In the literature, it is stated that the triggers for frailty are aging, smoking, being single, lack of physical activity, female gender, sarcopenia, multiple medication use, chronic progressive dyspnea, lack of activity, malnutrition, anemia, cachexia, decrease in muscle strength and mass (43, 44). Ierodiakonou et al. (2019) (23) indicated that the prevalence of frailty in adults with COPD was significantly associated with age, COPD stage, ineffective control of the disease, high symptom burden, number of exacerbations, smoking status, and accompanying comorbidities. Confirming the outcomes in the literature, our study demonstrated that advanced-stage COPD, being single, lower-income level, lower educational status, presence of comorbidities, and multiple medication use affected the severity of frailty in older adults with COPD. Besides, stage IV COPD was determined as the most significant variable in the severe frailty in our study. Additionally, the advanced analysis showed that those people over 70 years, had a lower educational level, and were diagnosed with HL had higher frailty in the present study. In addition, frailty may also increase due to reasons including weakening of functional capacity, shortening of walking distance, decrease in muscle strength, decrease in quality of life, repeated hospitalizations, and increased frequency of exacerbations in older adults with COPD. Therefore, disease management and self-care programs aimed at minimizing the care dependency in older adults with COPD are needed in clinical practice.

5. Conclusions and Recommendations

The relationship between dyspnea, care dependency, and frailty in older adults with COPD was assessed in the current study, and dyspnea, care dependency, and frailty were significantly correlated, and three of those increased, as the age increased. It is important to note that, evaluating the triad of dyspnea, care dependency, and frailty simultaneously, and using a holistic care approach while providing care to older adults with COPD. Further studies that consider advanced age, advanced stage of COPD, education level, income status, and comorbid conditions on dyspnea management, and alleviating care dependency and frailty are needed with a larger sample size for older adults with COPD.

Limitations

Our study has several limitations that need to be considered. The multiple linear regression models established for dyspnea, care dependency, and frailty variables explained more than 65% of the variation in scale scores. However, other variables that may influence these variables need to be studied in older adults with COPD. Our findings were based on a cross-sectional analysis rather than on longitudinal assessment of these variables. Thus, our findings are limited in terms of generalizability to a larger population. A longitudinal follow-up study is needed to further elucidate how dyspnea, care dependency, and frailty interact with each other over time in older adults with COPD.

Despite the limitations, the findings make an important contribution to the literature by reflecting the perceived severity of dyspnea, care dependency, and frailty among older adults with COPD, and multiple predictive factors for these three variables.

References

1. GOLD. Global Strategy for the Diagnosis, Management and Prevention of COPD Report. 2023. Retrieved from https://goldcopd.org/2023-gold-report-2/

2. WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogendioxide, sulfurdioxide and carbonmonoxide. 2021. https://www.who.int/publications/i/ item/9789240034228/.

3. Örnek T, Tor M, Kıran S, & Atalay F. Prevalence of chronic obstructive pulmonary disease in Zonguldak province of Turkey. Tuberkuloz ve Toraks. 2015; 63(3):170-177.

4. Mariniello DF, D'Agnano V, Cennamo D, Conte S, Quarcio G, Notizia L, ... & Perrotta F. Comorbidities in COPD: Current and future treatment challenges. Journal of Clinical Medicine. 2024; 13(3): 743.

5. Nazir SA, & Erbland ML. Chronic obstructive pulmonary disease: an update on diagnosis and management issues in older adults. Drugs & Aging. 2009; 26: 813-831.

6. López-Campos JL, Tan W, & Soriano JB. Global burden of COPD. Respirology. 2016; 21(1): 14-23. https://doi.org/10.1111/resp.12660

7. Rutten EP, Gopal P, Wouters EF, Franssen FM, Hageman GJ, Vanfleteren LE. ... & Reynaert, NL. Various mechanistic pathways representing the aging process are altered in COPD. Chest. 2016;149(1):53-61.

8. Kim SH, Lee H, Kim Y, Rhee CK, Min KH, Hwang YI, ... & Moon JY. Recent prevalence of and factors associated with chronic obstructive pulmonary disease in a rapidly aging society: Korea National Health and Nutrition Examination Survey 2015-2019. Journal Korean Medicine Sciences.2023; 38(14):e108.

9. GOLD. Global Strategy for the Diagnosis, Management and Prevention of COPD Report. 2020. https://goldcopd.org/gold-reports/

10. MacNee W. Is chronic obstructive pulmonary disease an accelerated aging disease? Annals of the American Thoracic Society. 2016;13(Supplement5):S429-S437. https://doi.org/10.1513/AnnalsATS.201602-124AW

11. Anzueto A, & Miravitlles M. Pathophysiology of dyspnea in COPD. Postgraduate Medicine. 2017;129(3):366-374. https://doi.org/10.1080/00325481.2017.1301190

12. Sharma S, & Sharma P. Prevalence of dyspnea and its associated factors in patients with chronic obstructive pulmonary disease. Indian Journal of Respiratory Care. 2019;8(1):36. 10.4103/ijrc.ijrc_21_18

13. Schlecht N, Schwartzman K, & Bourbeau J. Dyspnea as clinical indicator in patients with chronic obstructive pulmonary disease. Chronic Respiratory Disease. 2005;2(4):183-191. https://doi.org/10.1191/1479972305cd079oa

14. Nakken N, Janssen DJ, Wouters EF, van den Bogaart EH, Muris JW, de Vries GJ, . . . van Vliet M. Changes in problematic activities of daily living in persons with COPD during 1 year of usual care. Australian Occupational Therapy Journal.2020;67:447-457. https://doi.org/10.1111/1440-1630.12664

15. Hanlon P, Guo X, McGhee E, Lewsey J, McAllister D, & Mair FS. Systematic review and meta-analysis of prevalence, trajectories, and clinical outcomes for frailty in COPD. NPJ Primary Care Respiratory Medicine. 2023; 33(1): 1.

16. Marengoni A, Vetrano DL, Manes-Gravina E, Bernabei R, Onder G, & Palmer K. The relationship between COPD and frailty: a systematic review and meta-analysis of observational studies. Chest. 2018;154(1):21-40. https://doi.org/10.1016/j.chest.2018.02.014

17. Chen X, Mao G, & Leng SX. Frailty syndrome: an overview. Clinical Interventions in Aging. 2014;9:433. https://doi.org/10.2147/CIA.S45300

18. Lahousse L, Ziere G, Verlinden VJ, Zillikens MC, Uitterlinden AG, Rivadeneira F, . . . Ikram MA. Risk of frailty in elderly with COPD: a population-based study. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences.2016;71(5):689-695. https://doi.org/10.1093/gerona/glv154

19. Wang L, Zhang X, & Liu X. Prevalence and clinical impact of frailty in COPD: a systematic review and meta-analysis. BMC Pulmonary Medicine. 2023; 23(1): 164.

20. Dias LDS, Ferreira ACG, da Silva Junior JLR, Conte MB, & Rabahi MF. Prevalence of frailty and evaluation of associated variables among COPD patients. International Journal of Chronic Obstructive Pulmonary Disease. 2020; 1349-1356.

21. Maddocks M, Brighton LJ, Alison JA, Ter Beek L, Bhatt SP, Brummel NE, ... & Osadnik CR. Rehabilitation for People with Respiratory Disease and Frailty: An Official American Thoracic Society Workshop Report. Annals of the American Thoracic Society. 2023; 20(6): 767-780.

22. Bernabeu-Mora R, García-Guillamón G, Valera-Novella E, Giménez-Giménez LM, Escolar-Reina P, & Medina-Mirapeix F. Frailty is a predictive factor of readmission within 90 days of hospitalization for acute exacerbations of chronic obstructive pulmonary disease: a longitudinal study. Therapeutic Advances in Respiratory Disease. 2017;11(10):383-392. https://doi.org/10.1177/1753465817726314

23. Ierodiakonou D, Kampouraki M, Poulonirakis I, Papadokostakis P, Lintovoi E, Karanassos D, Dimopoulou S. Determinants of frailty in primary care patients with COPD: the Greek UNLOCK study. BMC Pulmonary Medicine.2019;19(1):1-9. https://doi.org/10.1186/s12890-019-0824-8

24. O'Donnell DE, Milne KM, James MD, de Torres JP, & Neder JA. Dyspnea in COPD: new mechanistic insights and management implications. Advances in Therapy. 2020; 37: 41-60.

25. Janssen DJ, Schols JM, Wouters EF, & Spruit MA. One-year stability of care dependency in patients with advanced chronic organ failure. Journal of the American Medical Directors Association. 2014;15(2):127-132. https://doi.org/10.1016/j.jamda.2013.10.002

26. Köberich S, Lohrmann C, & Dassen T. Care dependency in patients with chronic obstructive pulmonary disease and heart failure–a secondary data analysis of German prevalence studies. *Scandinavian* Journal of Caring Sciences.2014; 28(4):665-674. https://doi.org/10.1111/scs.12091

27. Faul F, Erdfelder E, Lang AG, & Buchner A. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007; 39(2):175-191.

28. Yorke J, Moosavi SH, Shuldham C, & Jones PW. Quantification of dyspnoea using descriptors: development and initial testing of the Dyspnoea-12. Thorax. 2010; 65(1):21-26. http://dx.doi.org/10.1136/thx.2009.118521

29. Gök Metin Z, & Helvacı A. Validity and Reliability of Turkish Version of the Dyspnea-12 Scale. Journal of Hacettepe University Faculty of Nursing. 2018; 5(2):102-115.

30. Dijkstra A, Tiesinga LJ, Goossen WT, & Dassen TW. Further psychometric testing of the Dutch Care Dependency Scale on two different patient groups. International Journal of Nursing Practice. *2002; 8*(6): 305-314. https://doi.org/10.1046/j.1440-172X.2002.00384.x

31. Yönt G, Akın Korhan E, Khorshid L, Eşer İ, & Dijkstra A. Bakım bağımlılığı ölçeğinin (Care Dependency Scale) yaşlı bireylerde geçerlik ve güvenirliğinin incelenmesi. Turkish Journal of Geriatrics. 2010;13:71.

32. Rolfson DB, Majumdar SR, Tsuyuki RT, Tahir A, & Rockwood K. Validity and reliability of the Edmonton Frail Scale. Age and Ageing. 2006; 35(5):526-529. https://doi.org/10.1093/ageing/afl041

33. Aygör HE, Fadıloğlu Ç, Şahin S, Aykar FŞ, & Akçiçek F. Validation of Edmonton frail scale into elderly Turkish population. Archives of Gerontology and Geriatrics. 2018; 76: 133-137. https://doi.org/10.1016/j.archger.2018.02.003

34. Gruenberger JB, Vietri J, Keininger DL, & Mahler DA. Greater dyspnea is associated with lower health-related quality of life among European patients with COPD. *International* Journal of Chronic Obstructive Pulmonary Disease. 2017;12: 937.

35. Lange P, Godtfredsen NS, Olejnicka B, Paradis BA, Curiac D, Humerfelt S, . . . Andersen EW. Symptoms and quality of life in patients with chronic obstructive pulmonary disease treated with aclidinium in a real-life setting. European Clinical Respiratory Journal. 2016; 3(1):31232. https://doi.org/10.3402/ecrj.v3.31232

36. Helvaci A, Gok Metin Z, Ozdemir L, & Ergun P. The Effects of a nurse-led education and counseling program on dyspnea, health status, and care dependency in patients with chronic obstructive pulmonary disease: A feasibility study. Home Health Care Management & Practice. 2019; 31(4): 249-256. https://doi.org/10.1177/1084822319850819

37. Kara N. *Care Dependency in Chronic Obstructive Pulmonary Disease.* (Master Thesis). Marmara University Health Sciences Institute, 2019. Istanbul.

38. Türk G, & Üstün R. Determination of the Care Dependency of Individuals with Chronic Obstructive Pulmonary Disease (COPD). E- Journal of 9 Eylül University Facult of Nursing. 2018; 11(1):19-25.

39. Kütükcü EÇ, Arıkan H, Sağlam M, Yağlı NV, İnal İnce D, Çiğdem Ö, Çöplü L. An investigation of the relationship between multidimensional disease severity and activities of daily living in patients with chronic obstructive pulmonary disease. Journal of Exercise Therapy and Rehabilitation. 2015;2(2): 53-60.

40. Khdour MR, Kidne JC, Smyth BM, & McElnay JC. Clinical pharmacy-led disease and medicine management programme for patients with COPD. British Journal of Clinical Pharmacology. 2009;68(4):588-598. https://doi.org/10.1111/j.1365-2125.2009.03493.x

41. Uchmanowicz I, Jankowska-Polanska B, Chabowski M, Uchmanowicz B, & Fal AM. The influence of frailty syndrome on acceptance of illness in elderly patients with chronic obstructive pulmonary disease. International Journal of Chronic Obstructive Pulmonary Disease. 2016; 11: 2401.

42. Galizia G, Cacciatore F, Testa G, Della-Morte D, Mazzella F, Langellotto A, Rengo F. Role of clinical frailty on long-term mortality of elderly subjects with and without chronic obstructive pulmonary disease. Aging Clinical and Experimental Research. 2011; 23(2):118-125. https://doi.org/10.1007/BF03351076

43. Buckinx F, Rolland Y, Reginster JY, Ricour C, Petermans J, & Bruyère O. Burden of frailty in the elderly population: perspectives for a public health challenge. Archives of Public Health.2015;73(1): 1-7. https://doi.org/10.1186/s13690-015-0068-x

44. Fairhall N, Kurrle S, Sherrington C, Lord S, Lockwood K, John B, Cameron I. Effectiveness of a multifactorial intervention on preventing development of frailty in pre-frail older people: study protocol for a randomised controlled trial. BMJ Open. 2015; 5(2): e007091-e007091. http://dx.doi.org/10.1136/bmjopen-2014-007091

Article Information Form

Author(s) Notes: The author(s) would like to express their sincere thanks to the editor and the anonymous reviewers for their helpful comments and suggestions.

Author(s) Contributions: All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.

Conflict of Interest Disclosure: No potential conflict of interest was declared by the author.

Supporting/Supporting Organizations: No grants were received from any public, private or nonprofit organizations for this research.

Ethical Approval and Participant Consent: Hacettepe University Non-Interventional Clinical Research Ethics Committee (Approval Number: GO 19/841, 2019/20-57, Approval date: 03.09.2019) approved the study. It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited from are stated in the bibliography.

Plagiarism Statement: This article has been scanned by iThenticate.