Original Article

Dyspnea, Health Status and Quality of Life in Patients with Chronic Obstructive Pulmonary Disease Aged under 65 Years

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) impairs quality of life due to its high symptom burden, particularly dyspnea. The impacts of COPD on the health status and quality of life in patients aged under 65 years have been poorly investigated.

Objectives: This is a study aimed at identifying the factors influencing dyspnea, health status, and quality of life and the correlation of these parameters with COPD patients aged under 65 years.

Methods: This descriptive cross-sectional study was conducted in chest disease outpatient and medical inpatient units of a university hospital in Ankara. A total of 112 patients with COPD were included with the convenience sampling methods in the study. Data were collected using the patient information form, Dyspnea -12 Scale, COPD Assessment Test (CAT), and St George's Respiratory Questionnaire (SGRQ). The data were analyzed using frequencies, percentages, median, interquartile range, Mann Whitney U test, and Spearman's rho correlation.

Results: The median scores of the scales were Dyspnea 12 scale 26.0, CAT score 29.0., SGRQ 69.5, respectively. The scores on Dyspnea 12 Scale and the CAT were significantly higher in patients with older age, women, primary school graduates, those whose income is less than their expenses ($p<0.05$). However, the SGRQ scores did not differ in terms of age, gender, and marital status ($p>0.05$). Dyspnea severity, health status, and quality of life were worse in patients diagnosed with an advanced stage of COPD, and in those with high smoking pack-years and a high number of acute exacerbations and co-morbid diseases ($p<0.05$). Besides, significantly positive correlations were detected between the Dyspnea 12 Scale, CAT, and SGRQ, and SGRQ and CAT scores ($p<0.001$).

Conclusion: With an increase in smoking pack-years, and acute exacerbations, the progression in COPD augments dyspnea and negatively impacts health status and quality of life in COPD patients under 65 years. An increase in the severity of dyspnea deteriorated health status and quality of life. As health status worsened, quality of life decreased. This result shows that quitting smoking and managing dyspnea and exacerbations can improve the health status and quality of life of COPD patients. [*Ethiop. J. Health Dev.* 2025; 39(1)]

Keywords: Dyspnea, nursing, chronic obstructive pulmonary disease, health status, quality of life

Introduction

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide because of its progressive nature and high symptom burden (1). Smoking exposure, outdoor and indoor air pollution from burning wood and other biomass fuels, deficiency of α-1 antitrypsin, factors affecting lung development in childhood, and low socioeconomic status are important risk factors for COPD. These multiple and complex risk factors have increased the prevalence of COPD, making it the third major cause of death worldwide. (1, 3) The global prevalence of COPD is estimated to be 8.2% to 12.8%, and approximately 3 million deaths occur annually due to COPD, 90% of which occur in low- and middle-income countries. The increasing prevalence of smoking in low- and middle-income countries, combined with the aging population in high-income countries, is estimated to result in over 5.4 million deaths per year from COPD and related diseases by 2060 (4-6). The increasing mortality and morbidity of COPD brings with it an economic and social burden and is becoming an issue that draws attention all over the world. (1, 3, 7).

Patients with COPD have various symptoms such as dyspnea, wheezing, coughing, phlegm, loss of appetite, weight loss, motor weakness, sleep disturbances, and fatigue (8, 9). Among these, dyspnea, mainly caused by progressive and irreversible airflow obstruction, is the most common and debilitating symptom that also induces the manifestation of other COPD symptoms (1, 3, 10-12). It may appear in every stage of COPD. It generally augments with physical activity and causes a decrease in exercise capacity thereby limiting the activities of daily living (11, 12). Dyspnea also causes restrictions in social and working life and induces sleep disturbances, fatigue, and psychological problems. As a consequence of severe dyspnea, many patients adopt a sedentary lifestyle and become more dependent on others which further impairs their health status and quality of life (8, 9, 13, 14).

Health status has been defined as the effect of health on the individuals' functional abilities to perform daily life, physical, emotional, and social activities (15). The health status of COPD patients is influenced by poor lung function, severe dyspnea, other co-morbid conditions, and low socioeconomic status (13, 14). Previous reports highlighted that a decrease in the health status of COPD patients is associated with impaired quality of life (14, 16-20). Severe COPD symptoms, impaired respiratory function tests, advanced stage of COPD, physical limitations due to a

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decrease in functional capacity, restrictions in daily, social, and working life, and psychological morbidities including anxiety and depression, deteriorate the quality of life (16-18).

Health status and quality of life have been considered important outcomes when assessing COPD patients. Accordingly, the fundamental goals of COPD treatment include the management of cardinal symptoms in particular dyspnea, maintaining health status, and improving quality of life (21, 22). Therefore, determining dyspnea severity, health status and quality of life in COPD patients is critical. In previous literature, dyspnea, health status and quality of life have been well-documented in older adults, since COPD was considereda disease affecting the elderly (23). On the other hand, COPD patients under 65 years may experience a similar degree of dyspnea and exercise impairment as older COPD patients, although the severity of airflow restriction is less in younger COPD patients (24-26). Given that the previous studies have focused mainly on older individuals and not on middle-aged individuals with COPD, this study aimed to investigate the factors influencing dyspnea, health status, and quality of life, and the relationship between these outcomes in COPD patients aged under 65 years. The evidence generated from this study will provide a better understanding for health professionals about the impact of COPD on patients under 65 years and provide an insight to plan healthcare services that are appropriate for these patients.

Material and methods

Study design and setting

This descriptive cross-sectional study was conducted at a university hospital between September 2018 and May 2019 in Ankara, Turkey. The hospital, where the study was conducted, is one of the leading health facilities among the 91 health facilities in Ankara, Turkey. In this hospital, the average numbers of outpatients and inpatients served are 60,000 and 2,700 per month respectively. The study was carried out in the chest disease outpatient and medical inpatient units. While only respiratory diseases are treated in the chest diseases outpatient, patients with all internal diseases are treated in the inpatient clinics.

Participants

Eligible patients included those aged between 40 and 64 years, diagnosed with COPD based on Global Initiative for Lung Disease (GOLD) criteria, conscious, oriented to place, time, and person, and who volunteered to participate. Patients with any physical or mental health problems that may influence communication such as tracheostomy, delirium, or dementia, and those who did not participate voluntarily were excluded. Based on the convenience sampling methods, a total of 176 patients were assessed for eligibility, and 46 of them were excluded because they did not meet inclusion criteria. Therefore, 130 patients were enrolled in the study. After enrollment, 18 patients were excluded from the study because their respiratory function test results could not be obtained. Thus, the remaining 112 patients constituted the study sample.

Sample size calculation

The sample size was calculated with G Power Software, based on the correlation between quality of life and health status in the pilot study findings. Considering the correlation coefficient of 0.59 between the St. George's Respiratory Questionnaire (SGRQ) and COPD Assessment Test (CAT), the minimum sample size was calculated as 112 with a power of 90%, a two-sided alpha value of 0.05, and a minimum correlation coefficient of 0.3.

Variables and instruments

In the study, dyspnea severity, health status, and quality of life were evaluated as the dependent variables. The independent variables of this study were socio-demographic and clinical characteristics.

Outcome measures

Patient information form

Patient information form was generated by researchers based on previous reports (1, 21, 27-29). This form consists of two parts: socio-demographic characteristics and clinical characteristics. While the sociodemographic characteristics section contains questions such as age, gender, and marital status, the clinical characteristics section includes questions such as COPD duration, stage, and medications used.

Dyspnea severity

The Dyspnea -12 Scale was used to assess the severity of dyspnea in the current study. The scale contains 12 items in a four-point Likert format ranging from 0 (none) to 3 (severe). The Dyspnea -12 scale consists of two sub-scales including physical and emotional. The ranges of physical and emotional subscale scores are 0–21, and 0–15, respectively. The total score varies from 0 to 36, with lower scores indicating a reduction in the severity of dyspnea (30). Cronbach's alpha coefficient was 0.97, and the total item correlation for each item ranged between 0.75 and 0.85 in the Turkish validity and reliability study (31).

Health status

The COPD Assessment Test (CAT) was used to evaluate health status in the current study. The CAT is a patient-reported scale assessing the impact of COPD symptoms on individuals' health. The scale consists of eight items, including cough, phlegm, chest tightness, breathlessness, activities, confidence, sleep, and energy. Each item is rated on a six-point Likert scale ranging from 0 (no symptom) to 5 (very serious). The total score varies between 0 and 40 points, with lower scores indicating better health status. Cronbach's alpha coefficient was calculated as 0.91 in the Turkish validity and reliability study (32).

Quality of life

Turkish version of Saint George's respiratory questionnaire (SGRQ) with a year recall period was used to assess the quality of life in the current study. The SGRQ is a disease-specific questionnaire designed to measure the impact of obstructive airway diseases on overall health, daily life, and perceived well-being.

It contains 50 items measuring three components: (1) symptoms, (2) activity and (3) impact. The symptoms component included eight items that interrogated the severity and frequency of respiratory symptoms such as cough, phlegm, and breathlessness. The activity component included 16 items that assessed the effects of breathlessness on mobility and physical activity. As for the impact component, it included 26 items that examined disturbances to psychological and social functioning resulting from the disease in detail. A score for each component and a total score can be calculated with a range from 0 to 100, with higher scores indicating poorer quality of life (33). Cronbach's alpha coefficient of SGRQ was calculated as 0.88 in the Turkish validity and reliability study (34).

Data collection procedure

The principal investigator evaluated whether patients met inclusion criteria after being confirmed as having COPD by a physician in these units. After explaining the study objective and obtaining informed consent, the principal investigator collected data using a patient information form and Turkish adapted Dyspnea -12 scale, CAT, and SGRQ, through face-to-face interviews. 15-20 minutes was approximately enough to collect data from each patient. After the data were obtained from the patients, uncertain and incomplete data (especially regarding medication, number of exacerbations, etc.) were obtained from the patient's doctor and file. Additionally, the data were collected only by the principal investigator to decrease the risk of systematic and researcher bias in data collection.

Statistical analysis

The data analysis was performed using SPSS Statistics 23.0. Kolmogorov Smirnov test was used to test the normality assumption for quantitative variables. Since the data were not distributed normally, non-parametric statistics were utilized. Frequencies, percentages, median, and interquartile range were calculated for descriptive statistics. Mann Whitney U test was used to compare dyspnea, health status, and quality of life scores in terms of age, gender, marital status, education level, income status, smoking pack-years, COPD stage and number of exacerbations and co-morbid diseases. The Bonferroni adjustment method was utilized for multiple comparisons. Spearman's rho correlation coefficient was used to measure correlations between dyspnea, health status, and quality of life scores. P values < 0.05 were considered statistically significant except when Bonferroni adjustment for multiple comparisons was applied.

Ethical considerations

The current study was approved by the non-interventional clinical trials ethics committee of X University (Decision number: GO18/607). The principal investigator informed all participants about the study protocol and obtained their written informed consent. The participants could withdraw from the study without stating a reason and they were not expected to pay for anything. This study was performed in accordance with the Helsinki Declaration of 2013.

Results

Socio-demographic and clinical characteristics of participants

The median age of participants was 60.0 years and almost two-thirds, 80 (72.4%), were in the range of 55 -64 years. Most of the participants were men, 77 (68.8%), married, 90 (80.4%), and lived with a wife or with a wife and children, 90 (80.4%). The study sample mostly included primary school graduates (n) (49.2%) and retired (n) (%65.2%). Moreover, 50.9% of patients' income was less than their expenses, and 60.7 % of them were overweight and obese. Half of the participants were ex-smokers while 32.1% were current smokers. Also, the median smoking pack-years was 40, and 46.6% of patients smoked more than 41 pack-years. (Table 1).

More than half of the participants 65 (58.0%) were diagnosed with stage I or II (mild/moderate) COPD; the median COPD duration was 4.5 years. Considering pulmonary function test parameters, the median FEV1/FVC value was 62.3, median FEV1 value (of predicted) and FVC value (of predicted) were 52.58 and 71.5, respectively. More than half of the patients (58.0%) reported the need for oxygen therapy, and 18.7% of patients used a BPAP device. Considering medications used for COPD management, a large part of patients used beta-2 agonists (93.8%) and anticholinergics (86.6%). Moreover, 83.0% of the patients had one to two comorbid conditions. The most common co-morbid conditions were hypertension (43.0%), diabetes (43.0%), and coronary heart disease (32.3%). The median number of acute exacerbations (requiring emergency department visits or hospitalization) in the last year was two and 39.3 % of patients reported more than 2 acute exacerbations (Table 2)

Table.1 Socio-demographic characteristics of participants (n=112)

Characteristics			**Median (IQR)**
COPD duration			4.5(8.0)
FEV1/FVC			62.3 (13.9)
FEV1 (% of predicted)			52.5 (25.5)
FVC (% of predicted)			71.5 (26.7)
GOLD stage			
Stage I-II	65	58.0	
Stage III-IV	47	42.0	
Need for oxygen therapy			
Yes	58	51.8	
No	54	48.2	
Presence of using BPAP device			
Yes	21	18.7	
No	91	81.3	
Medications used for COPD			
Beta 2 agonist	105	93.8	
Anticholinergic	97	86.6	
Corticosteroid	70	62.5	
Methylxanthine	16	14.3	
Antibiotic	14	12.5	
Mucolytic	3	2.7	
Number of co-morbid conditions*			
<3	70	62.5	
≥3	42	37.5	
Number of exacerbations in the last years			2.0 (3.0)
≤2	68	60.7	
>2	44	39.3	

IQR, Interquartile range

*Underweight= <18.5kg/m², Normal=18.5 kg/m²-24.9 kg/m², Overweight= 25.0 kg/m² -29.9 kg/m², Obese=>30 kg/m²

Table. 2 Clinical Characteristics of Participants (n=112)

Characteristics	n	%	Median (IQR)
Age (year)			60.0(9.0)
40-55	32	28.6	
56-64	80	72.4	
Gender			
Male	77	68.8	
Female	35	31.2	
Marital status			
Married	90	80.4	
Single	22	19.6	
Living status			
Alone	22	19.6	
With wife or with wife and children	90	80.4	
Educational level			
Primary school	55	49.1	
High school	43	38.4	
University	14	12.5	
Employment			
Unemployed	20	17.9	
Retired	73	65.2	
Employed	19	17.0	
Income status			
Income<expense	57	50.9	
Income=expense	46	41.1	
Income >expense	9	8.0	
Body mass index*			
Underweight	3	2.7	
Normal	41	36.6	
Overweight and obese	68	60.7	
Smoking status			
Current Smoker	36	32,1	
Ex-smoker	56	50.0	
Never smoked	20	17.9	
Smoking Pack-years (n=92)			40 (24.5)
<40	49	53.4	
≥41	43	46.6	

*IQR , Interquartile Range COPD, Chronic obstructive pulmonary disease; FEV1, Forced expiratory volume in the first second; FVC, Forced vital capacity; GOLD, Global Initiative for obstructive pulmonary disease; BPAP, Bi-level pulmonary airway pressure.

*Most common comorbid conditions include hypertension (43.0%), diabetes mellitus (43.0%), coronary heart disease (32.3%), hearth failure (31.2%) and depression (12,9%).

Comparison of dyspnea severity, health status, and quality of life scores by sample characteristics

The median total score of Dyspnea 12 scale was 26.0, with 14.0 (physical) and 10.0 (emotional) for subscales. The median CAT score was 29.0. Median total score of SGRQ was 69.5, with 71.4 (symptom), 63.0 (impact) and 70.6 (activity) for subscales (Table 3).

Table 3. Dyspnea severity, health status and quality of life scores of the participants (n=112)

Scale	Median (IQR)
Dyspnea-12	
Physical	14.0 (8.0)
Emotional	10.0 (9.0
Total	26.0 (15.7)
CAT	29.9 (11.7)
SGRQ	
Symptom	71.4 (32.1)
Impact	63.0 (38.2)
Activity	70.6 (33.1)
Total	69.5 (33.1)

IOR, Interquartile Range

Physical and emotional scores of the Dyspnea 12 Scale were significantly higher in female patients who were diagnosed with an advanced stage of COPD, and those who had >2 acute exacerbations and ≥3 co-morbid diseases ($p<0.05$). Moreover, the physical score was higher in patients aged between 56 and 64 years and primary school graduates ($p<0.05$). While the physical subscale score did not show a statistical difference in terms of smoking pack-years, the emotional subscale score was significantly higher in patients with ≥41 pack years. As for the total dyspnea score, the score did not show a significant difference with regard to age and marital status ($p>0.05$). The corresponding score was significantly higher in females, primary school graduates, those having ≥41 pack-years, individuals diagnosed with the advanced stage of COPD, those having >2 acute exacerbations, and ≥ 3 co-morbid diseases ($p<0.05$).

The CAT score was significantly higher in patients aged between 56 and 64 years, who were female, primary school graduates, those whose income was less than expenses and ≥41 pack-years, diagnosed with the advanced stage of COPD, and those who had >2 acute exacerbations, and ≥ 3 co-morbid diseases ($p<0.05$). The CAT score did not show a significant difference with regard to marital status.

Considering SGRQ, total and sub-dimension scores of the scale did not show any statistical significance in terms of age, gender, and marital status ($p>0.05$). The related scores were significantly higher in patients who were primary school graduates, whose income was less than expenses, diagnosed with the advanced stage of COPD, and those who had >2 acute exacerbations, and ≥ 3 co-morbid diseases. While activity subscale scores did not differ in terms of smoking pack-years ($p>0.05$), symptom and impact subscale scores were significantly higher in patients with ≥41 pack-years ($p<0.05$) (Table 4).

Table 4. Comparison of dyspnea severity, health status, and quality of life scores by selected patient characteristics

	CAT	Dyspnea-12			SGRQ			
	Total*	**Physical***	**Emotional***	**Total***	**Symptom***	**Impact***	**Activity***	**Total***
Age								
40-55	22.0 (12.5)	14.0 (9.5)	10.0 (9.0)	25.0 (17.0)	64.1 (37.4)	58.6 (47.0)	68.5 (36.1)	67.5 (38.0)
56-64	30.0 (11.0)	16.0 (7.0)	10.0 (9.0)	27.0 (15.0)	73.2 (30.4)	66.2 (37.0)	73.9 (24.6)	70.0 (29.9)
Test statistic[a]	z=-2.47 **p=0.014**	z=-2.14 **p=0.032**	z=-0.17 p=0.858	z=-1.32 p=0.185	z=-1.90 p=0.057	z=-0.48 p=0.629	z=-1.58 0.113	z=-1.08 p=0.276
Gender								
Male	28.0 (12.0)	14.0 (8.0)	10.0 (9.0)	24.0 (14.0)	66.5 (34.8)	59.9 (39.7)	70.6 (30.5)	65.9 (31.9)
Female	31.0 (13.0)	16.0 (7.0)	13.0 (6.0)	28.0 (14.0)	76.4 (28.0)	73.0 (32.0)	77.5 (43.6)	76.1 (31.0)
Test statistic[a]	z=-2.13 **p=0.03**	z=-2.05 **p=0.04**	z=-2.12 **p=0.03**	z=2.39 **p=0.01**	z=-1.79 p=0.07	z=-1.66 p=0.09	z=-0.39 p=0.69	z=1.37 p=0.16
Marital Status								
Married	30.0 (12.0) 28.0 (11.0)	15.0 (8.0) 14.0 (8.0)	11.0 (9.0) 10.0 (9.0)	27.0 (16.0) 24.0 (12.0)	75.8 (33.3) 64.7 (17.5)	64.6 (39.1) 57.9 (38.0)	73.9 (30.2) 70.3 (30.5)	71.4 (34.4) 60.6 (27.6)
Single								
Test statistic[a]	z=-0.99 p=0.32	z=-1.26 p=0.20	z=-0.46 p=0.64	z=-0.85 p=0.39	z=-1,12 p=0.25	z=-0.70 p=0.48	z=-1.83 p=0.06	z=-1.35 p=0.17
Education level								
Primary**	30.0 (9.0) 24.6 (13.0)	16.0 (7.0) 14.0 (9.0)	12.0 (7.0) 10.0 (10.0)	28.0 (13.0) 21.5 (18.0)	76.4 (28.5) 61.1 (38.0)	73.8 (28.7) 47.5 (34.0)	77.5 (25.7) 66.9 (31.4)	76.0 (27.8) 53.3 (31.7)
High***								
Test statistic[s]	z=-3.09 **p=0.02**	z=-2.39 **p=0.01**	z=-2.25 p=0.06	z=-2.25 **p=0.02**	z=-2.59 **p=0.01**	z=-3.43 **p=0.001**	z=-3.38 **p=0.001**	z=-3.71 **p<0.001**
Income Status								
Income<expe	30.0 (12.0)	15.0 (8.0)	11.0 (10.0)	27.0 (16.0)	75.2 (30.1) 66.4 (37.0)	69.3 (36.8) 58.5 (38.5)	77.6 (28.5) 70.2 (20.5)	76.4 (33.1) 62.5 (31.8)
e	26.0 (11.0)							
Income≥expe		14.0 (9.0)	10.0 (9.0)	24.0 (15.0)				
se								
Test statistic[a]	Z=-2.28 **p=0.02**	Z=-0.19 p=0.84	Z=-1.05 p=0.29	Z=-0.48 p=0.62	Z=-1.65 **p=0.09**	Z=-1.95 **p=0.05**	Z=-2.42 **p=0.01**	Z=-2.34 **p=0.01**
Smoking pack years								
<40	25.0 (13.0)	14.0(11.0)	9.0	21.0	65.0 (36.5)	55.6 (40.6)	67.7 (31.2)	59.4 (32.2)
≥41	30.0 (11.0)	14.0 (7.5)	(10.0) 11.0 (9.5)	(17.0) 26.0 (15.0)	74.7 (31.0)	66.5 (37.7)	73.9 (30.2)	72.1 (29.4)
Test statistic[a]	z=-2.7 **p=0.006**	z=1.8 p=0.07	z=-2.0 **p=0.03**	z=-1.9 **p=0.047**	z=-2.4 **p=0.014**	z=-2.2 **p=0.018**	z=-1.6 p=0.091	z=-2.3 **p=0.018**
COPD stage								
I-II	24.0 (11.5)	14.0 (7.5)	9.0 (9.5)	21.0 (14.5)	65.1(16.2) 84.7 (28.1)	51.7 (39.3) 74.5 (22.9)	66.9 (23.7) 84.6 (22.0)	57.1 (32.4) 77.2 (22.8)
III-IV	30.0 (11.0)	19.0 (7.0)	13.0 (6.0)	30.0 (11.0)				
Test statistic[a]	z=-4.7 **p<0.001**	z=-4.0 **p<0.001**	z=-3.1 **p<0.001**	z=-3.9 **p<0.001**	z=-3.6 **p<0.001**	z=-4.0 **p<0.001**	z=-3.9 **p<0.001**	z=-4.2 **p<0.001**
Number of Exacerbations								
≤ 2	25.0 (11.0) 32.5 (7.0)	14.0 (7.0) 19.0 (7.0)	9.5 (9.0) 13.0(6.0)	22.0 (15.0) 31.0 (11.0)	61.5 (28.7) 87.0 (15.6)	51.2 (36.2) 79.0 (21.8)	66.9 (36.0) 77.6 (21.7)	56.3 (31.4) 78.4 (18.3)
>2								
Test statistic[a]	z=-4.1 **p<0.001**	z=-4.2 **p<0.001**	z=-3.2 **p=0.001**	z=-4.0 **p<0.001**	z=-5.2 **p<0.001**	z=-5.0 **p<0.001**	z=-3.9 **p<0.001**	z=-5.0 **p<0.001**
Number of co-morbid disease								
1-2	27.5 (12.0)	14.0 (8.2)	9.0 (9.0)	22.0 (16.0)	64.7(34.) 82.1 (30.4)	55.3 (39.1) 77.3 (22.8)	66.9 (30.4) 84.6 (22.6)	59.0 (30.7) 77.6 (19.0)
≥3	32.5 (11.3)	19.0 7.3)	13.5 (5.0)	30.5 (9.5)				
Test statistic[a]	z=-2.3 **p=0.018**	z=-2.8 **p=0.004**	z=-3.4 **p=0.001**	z=-3.3 **p=0.001**	z=-3.6 **p<0.001**	z=-3.4 **p=0.001**	z=-3.1 **p<0.001**	z=-3.6 **p<0.001**

COPD, Chronic Obstructive Pulmonary Disease; CAT, COPD Assessment Test; SGRQ, St George's Respiratory Questionnaire.
[a]Mann Whitney U test was utilized to detect statistical significance.
* Median (Interquartile Range) **Primary School, ***High school and university,

Correlation between dyspnea, health status, and quality of life

Physical, emotional and total scores of the Dyspnea 12 scale were positively correlated with the CAT score ($p<0.05$). A positive correlation was also established between the Dyspnea 12 scale and SGRQ with regards to their respective subscales and total score ($p<0.05$). In addition, the CAT Score was positively correlated with SGRQ's subscales and total score (Table 5).

Table 5. Correlation between dyspnea severity, health status and quality of life

		CAT	**Dyspnea 12 Scale**			**SGRQ**			
		Total	Physical	Emotional	Total	Symptom	Impact	Activity	Total
CAT	r	1.000							
	p	-							
Dyspnea 12 Scale									
Physical	r	0.759	1.000						
	p	**>0.001**	-						
Emotional	r	0.666	0.687	1.000					
	p	**>0.001**	**>0.001**	-					
Total	r	0.776	0.919	0.910	1.000				
	p	**>0.001**	**>0.001**	**>0.001**	-				
SGRQ									
Symptom	r	0.734	0.698	0.593	0.696	1.000			
	p	**>0.001**	**>0.001**	**>0.001**	**>0.001**	-			
Emotion	r	0.751	0.738	0.754	0.808	0.734	1.000		
	p	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	-		
Activity	r	0.664	0.548	0.559	0.593	0.548	0.695	1.000	
	p	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	-	
Total	r	0.803	0.754	0.743	0.809	0.793	0.963	0.837	1.000
	p	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	**>0.001**	-

CAT, COPD Assessment Test; SGRQ, St George's Respiratory Questionnaire.
r: Spearman's Rho Correlation co-efficient.

Discussion

COPD is a major health problem that influences not only older people but also individuals aged under 65 years. Considering existing literature, the impacts of COPD have been mostly investigated in the elderly (35-38). A limited number of studies have been conducted on middle-aged adults with COPD, which indicate that individuals aged under 65 experience an equal disease burden as older patients (24, 26). However, the factors influencing dyspnea, health status, and quality of life, and the relationship between these outcomes in COPD patients under 65 years, were not adequately addressed. To the best of our knowledge, this study is the pioneer in investigating these parameters in this population.

In the current study, the physical effects of dyspnea became more severe as age increased in COPD patients under 65 years. Previous reports indicated that dyspnea severity was higher in middle-aged adults compared to older adults (24, 26). Since our study sample included only middle-aged adults, we did not make a direct comparison with the previous one. However, increasing age may cause deterioration in lung functions and health status, and also lead to an increase in co-morbid diseases and augmentation in the physical impacts of dyspnea, which may explain our findings (8, 21).

Considering the quality of life reported in the studies investigating age differences in COPD patients, the influence of age on quality of life in patients with COPD is controversial. Some of the previous reports indicated that there is no association between these parameters (19, 26, 39), some of them supposed that an increase in age worsened quality of life (40, 41) and some of them highlighted that under the age of 65 is related to worse quality life scores (24, 26). In the current study, we found that quality of life did not differ by age. These differences between the outcomes of studies may arise from the distribution of other sample characteristics that may affect the quality of life such as gender, disease duration and stage, and co-morbid conditions. Another possible explanation of these differences may be that quality of life is a subjective outcome that can also be affected by individual expectations, and familial and cultural factors (22, 33).

We found that dyspnea severity was higher, and health status was poorer in females compared to males. In line with our findings, previous reports have also highlighted that females experience more severe dyspnea, and their health status is more affected by COPD symptoms (42-44). These findings may be due to the fact that females are more susceptible to tobacco smoke and their pulmonary functions deteriorate more easily compared to males (42, 45-47). In addition, biological, genetic, anatomical, hormonal, social, and environmental factors may explain the preponderance of severe dyspnea and poor health status in women (42-44).

The earlier studies determining quality of life in COPD patients show conflicting results about gender differences (17, 41, 44, 45, 48-50). However, in our study, the quality of life did not differ by gender. While a number of reports indicate that females have worse quality of life scores (41, 44, 45, 48), some of them propose that gender does not influence the quality of life (17, 49, 50). Since the quality of life is a multidimensional concept affected by multiple factors, it is not possible to make a firm inference about the impacts of gender on the quality of life in COPD patients.

Considering other socioeconomic characteristics, we found that higher education and income levels were associated with better health status and quality of life (51-54), similar to other studies. These findings may be due to the fact that well-educated individuals can think more logically, and individuals with better income and education levels can access more opportunities (55, 56). Therefore, since this situation will make educated individuals advantageous in coping with and managing the disease (55, 57), increasing the education level and income level may positively affect health status and quality of life (54, 56). It is already known that low socioeconomic factors are a very important risk factor in the development and progression of chronic diseases (3, 58, 59). In our study, the dyspnea severity, health status (60) and quality of life (60) did not change according to marital status, but these findings may be due to the higher number of married individuals (%80.4) in the study.

The lung damage caused by oxidative substances in tobacco smoke and the chronic inflammatory process developed in response to oxidant stress plays a role in the progression of COPD (21, 61, 62). Previous reports indicated that an increase in the amount and duration of smoking augments dyspnea (12, 63, 64), and worsens health status (21, 63, 65), and quality of life in COPD patients (14, 17, 50). Similarly, we found that the severity of dyspnea increased, and health status and quality of life deteriorated as the smoking pack-years increased.

In our study, patients with an advanced stage of COPD had more severe dyspnea and poorer health status and quality of life. Earlier studies similarly highlighted that the progression of COPD stage contributes to the aggravation of dyspnea (66-69), deterioration in health status (17, 32, 65, 70, 71), and quality of life (9, 39, 49, 72, 73). These findings may be explained by the fact that as the air trapping in alveoli increases COPD progresses to advanced stages and the severity of dyspnea increases, thereby restricting daily life.

The other important problem of COPD is acute exacerbations. Acute exacerbations have significant economic and clinical outcomes on COPD (3, 7). One of the main goals of COPD treatment and management is to prevent acute exacerbations that require hospitalization or emergency department visits (3, 74). It is emphasized in the literature that increasing acute exacerbation in COPD leads to permanent or temporary negative effects on lung functions, increases symptom severity, reduces exercise capacity, and negatively affects disease prognosis (71, 74, 75). In line with the literature, we found that an increase in the frequency of acute exacerbation augments dyspnea (75), and worsens health status (71, 74, 75), and quality of life (74, 75) in COPD patients.

The dyspnea severity (12, 14), health status (76, 77), and quality of life (50, 78) in COPD patients may be affected by the number of co-morbid diseases. Hypoxia, systemic inflammation, muscle atrophies, and cachexia occurring in COPD may pose the risk of occurrence or lead to an increase in the burden of co-morbidities such as ischemic heart disease, chronic heart failure, osteoporosis, anemia, diabetes mellitus and depression (28, 79). Earlier studies indicated that cardiovascular diseases and depression may contribute to the growing COPD burden more than other co-morbidities (14, 39, 77, 78). In our study, as the number of co-morbid diseases increased, dyspnea aggravated, and the health status and quality of life worsened. This finding may be explained by the fact that the most common co-morbidities in our study sample included cardiovascular diseases and depression.

The health status, dyspnea severity, and quality of life in COPD are important components that influence each other. Earlier studies have highlighted that severe dyspnea is related to poor health status and worse quality of life, similar outcomes were observed in our study (12, 69, 73, 80). Furthermore, we found that as dyspnea severity increased, quality of life decreased. In consistent with our findings, previous reports also highlighted that dyspnea is one of the most important symptoms that impair the quality of life in COPD patients (9, 39, 40, 81, 82). Yorke et al. (83) confirmed our findings by reporting that severe dyspnea affected all domains of health-related quality of life in COPD patients.

Poor health status may limit daily life activities, increase dependency on others and deteriorate the quality of life in COPD patients. Previous studies have reported that health status is associated with quality of life (32, 72, 73, 78). Our study also confirmed that quality of life was worse in patients with poorer health status.

Limitations: This study had several limitations. First, this study was conducted as descriptive research in a single center in Turkey, limiting the generalizability of

findings in different populations. Second, the study was conducted with a limited number of individuals. Nonetheless, the sample was recruited from one of the most important public hospitals for chest diseases in Turkey, which serves patients from all over the country. Although we only included certain age group patients in our study and managed the data collection process with a single questionnaire, we could not completely control the confounding effects. Finally, in our study, the statistical model in which we measured the existence and severity of the relationship between the variables is limited. The negative impact of this situation on the results should be taken into account. It is recommended to conduct studies with high statistical power in which the relationship between variables can be better explained.

Conclusion

This study concluded that dyspnea severity, health status, and quality of life worsened, as smoking pack-years, COPD stage, and the number of acute exacerbations and co-morbid diseases increased. Another important outcome of the study is that patients aged 55-64 years, women, primary school graduates, and those whose income is less than their expenses had more severe dyspnea and poorer health status. On the other hand, quality of life was not associated with age, gender, and marital status. Besides, an increase in dyspnea severity worsens health status and quality of life, and as health status worsens quality of life deteriorates. Based on the outcomes of this study, nurses and other healthcare professionals should pay attention to COPD patients who are under 65 years of age, female, have low education and income levels and have comorbid diseases during patient care. Additionally, quitting smoking and managing dyspnea and exacerbations are so crucial to improve COPD patients' health status and quality of life.

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