



Original Article

Evaluation of the relationship between the levels and perceptions of dyspnea and the levels of anxiety and depression in chronic obstructive pulmonary disease (COPD) patients

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Abstract

Objectives: This study was performed with a descriptive design to determine the relationship between level and perception of dyspnea and levels of anxiety and depression.

Methods: The research data were collected using the Medical Research Council Scale and HAD via face-to-face interviews.

Results: The study consisted of a total of 90 individuals, which included 8 women and 82 men, with chronic obstructive pulmonary disease. It was determined that the average anxiety score was 7.42 ± 4.43 (min: 0–max: 20) and that the average depression score was 8.85 ± 4.23 (min: 3–max: 18). According to the logistic regression analysis results, among the participants, those who indicated they had severe dyspnea or a background of psychiatric illness or showed depression symptoms had a 22.75 times, 4.304 times and 17.528 times higher risk, respectively, for anxiety symptoms. There was a greater risk of depression (5.957 times) in the participants who were suffering from severe dyspnea than in the patients with mild dyspnea, and a 22.181 times greater risk of depression in the participants who had been admitted to a hospital three or more times and a 12.352 times greater risk in patients who had been admitted one or two times a year than in the participants who had never been admitted to a hospital. Finally, there was a 28.712 times greater risk of depression in patients who did not have social support versus those that had, and there was a 23.294 times greater risk of depressive symptoms in patients who presented symptoms of anxiety than in patients who did not.

Conclusion: Individuals with a high perception of dyspnea had a high risk of both depression and anxiety.

Keywords: Anxiety; chronic obstructive pulmonary disease; depression; perception of dyspnea.

Chronic obstructive pulmonary disease (COPD), which is a preventable and treatable disease, develops due to exposure to harmful gases and particles, especially cigarette smoke. The disease is not fully reversible and is a common cause of progressive airflow limitation. Worldwide, COPD is a major cause of morbidity and mortality and is the third leading cause of death in the world and in Turkey.^[1,2] Although there has been a significant decrease in the other leading causes of death, COPD mortality has increased by 63%.^[3]

As the disease progresses, symptoms such as dyspnea and fatigue increase in conjunction with increased airway obstruction. These symptoms lead to the deterioration of vital daily functions, like walking, bathing and even eating, resulting in patients eventually becoming dependent on others.^[4,5] Dyspnea, which is the most common symptom of COPD, can have major negative impacts on patients, including intense fear, inadequacy in performing daily-life activities, increasing levels of dependency, fear of death, and severe anxiety and de-

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pression.^[6,7] In these cases, the anxiety and depression level of the individual is directly correlated with the level of dyspnea.^[4,7,8] In the literature, the studies that look at dyspnea as a subjective experience define it differently for every individual. The studies also show that 100% of patients with COPD experience dyspnea,^[6] that patients perceive dyspnea as the worst symptom,^[9] and that they live in a state of distress and face limitations in being able to fulfill vital daily activities.^[9,10] All these biopsychosocial problems may result in patients experiencing anxiety and depression.^[7,11,12] Anxiety and depression are reported to be the most common mental disorders associated with COPD.^[8,13] According to studies from the literature, the prevalence of anxiety is estimated to be between 2–96%,^[14,15] while for depression, the approximate prevalence is estimated to be between 6% and 56% in COPD patients.^[14,16] Studies that have been carried out with COPD patients in Turkey have focused on the issues of self-care capability,^[12] self-efficacy,^[16–18] quality of life,^[5,16] anxiety and depression,^[4,13,19] and social support,^[20] but there are no studies that have examined the relationship between dyspnea and mental health. Therefore, studies that could serve as a guide to healthcare professionals who work with COPD patients are needed.

The aim of this study was to evaluate the relationship between the severity of dyspnea and levels of anxiety and depression in COPD patients and to determine other predictive factors for anxiety and depression in an analytic manner.

Materials and Method

Study Type

This study used a descriptive design and was performed to determine the relationship between level and perception of dyspnea and levels of anxiety and depression among COPD patients.

Sub-problems of the Study

1. Do objective values of dyspnea affect the risk for anxiety symptoms?
2. Do objective values of dyspnea affect the risk for depression symptoms?
3. Do subjective values of dyspnea affect the risk for anxiety symptoms?
4. Do subjective values of dyspnea affect the risk for depression symptoms?

Study Population and Sampling

The universe of the study consisted of 326 COPD patients who had been admitted to Duzce University Research and Practice Hospital Chest Diseases Polyclinic and Emergency Service between 01.01.2009 and 12.31.2009. The sample size was determined to be 96 according to the formula of $n = Nt^2pq/d^2$ ($N-1$) $+t^2pq$, with a 0.5% error rate, within 95% confidence interval and a COPD incidence of 13%. The study was completed with

90 COPD patients, all of whom agreed to participate in the study and did not have any perceptual disorders.

This hospital was selected because it was the largest hospital in the city using advanced diagnostic and treatment methods and had a high incidence of COPD patients.

Exclusion Criteria of the Study

Individuals who:

- had a FEV₁/FVC <70,
- had a severe mental or physical disorder that may prevent them from understanding the questions in the questionnaire and answering them correctly,
- did not agree, either through writing or orally, to participate in the study were excluded from the study.

Limitations of the Study

- The study was limited to the patients who were diagnosed and treated at Duzce University Research and Practice Hospital Pulmonology Service and Chest Diseases Polyclinic
- The symptoms of anxiety and depression were limited to the items included on the Hospital Anxiety Depression (HAD) Scale.

Data Collection Tools used in the Study

The data were collected via face-to-face interviews using the Patient Description Form, Medical Research Council Scale and Hospital Anxiety Depression Scale (HADS). Respiratory function tests and arterial blood gas results were used to determine disease stage.

Patient Description Form: Composed of 24 open- and closed-ended questions, this form was prepared by the researchers to determine the socio-demographic characteristics and the disease-, treatment- and dyspnea-related information of the patients with COPD.

Medical Research Council Scale (MRCS): The Medical Research Council Scale (MRCS) has been used for grading the effect of breathlessness on daily activities for many years.^[10,19,21] Developed by Fletcher in 1952, this scale specifically measures perceived respiratory disability.^[22] The MRCS is simple to administer as it allows the patients themselves to indicate the extent to which their breathlessness affects their mobility. The MRC dyspnea scale is a questionnaire that consists of five statements about perceived breathlessness: grade 1, "I only get breathless with strenuous exercise"; grade 2, "I get short of breath when hurrying on a flat surface or going up a slight hill"; grade 3, "I walk slower on a flat surface than people of the same age because of breathlessness or have to stop for a breath when walking at my own pace on a flat surface"; grade 4, "I stop for a breath after walking 100 yards or after a few minutes on a flat surface"; grade 5, "I am too breathless to

leave the house^[23,24] MRCS has been used in many studies as a safe, reliable method for evaluating the perception of dyspnea.^[10,19,22,25]

Hospital Anxiety Depression Scale (HADS): HADS, developed by Zigmond and Snaith^[22] in 1983, is used to measure the risk level and severity of anxiety and depression. The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-report screening scale that was originally developed to indicate the possible presence of anxiety and depressive states in the setting of a medical out-patient clinic. It contains two 7-item scales, one for anxiety and one for depression, both with a score range of 0–21. The scale is arranged as a 4-point Likert-type, with anxiety (HADS-A) and depression (HADS-D) subscales. According to results of the validity and reliability study conducted in Turkey, the cut-off score of the anxiety sub-scale was found to be 10/11, and 7/8 for the depression sub-scale.^[26] In verifying the reliability of this study, Cronbach's alpha coefficient was determined as 0.70 for the anxiety subscale and as 0.65 for the depression subscale.

Pulmonary Functioning Tests: Pulmonary functioning tests (FEV₁, FEV₁/FVC) and blood gas levels (pO₂ and pCO₂) were measured to determine stage of disease. The FEV₁/FVC value was used to identify the patients who were able to be included in the scope of the research. Those with an FEV₁/FVC value below 70% were included in the study. FEV₁ was used to determine the stage of the disease. COPD is a disease that involves four stages: a mild stage, where the FEV₁ value is above 80%, a moderate stage, where the FEV₁ value is between 50–79%, a severe stage, where the FEV₁ value is between 30–49%, and a very severe stage, where the FEV₁ value is below 30%. Results obtained from the blood gas values and pulmonary function tests were used as references in the objective evaluation of dyspnea.

Collection of Data

Data collection forms were filled out after interviewing the patients face-to-face, at which point they were informed about the aim of the study and their written consents were obtained. Ethics approval to conduct the study was obtained from the Department of Chest Diseases (date: 03.25.2010 and no:91) and the Non-invasive Clinical Research Ethics Committee (date: 05.28.2010 and no:5) of the Duzce University Faculty of Medicine.

Statistical Analyses

The data were assessed using the statistical package program PASWv.18. In the analysis of data, Pearson correlation was used to indicate the relationship between hospital anxiety and depression subscales and objective and subjective values of dyspnea, while logistic regression was used to examine all other variables which affect anxiety and depression. In the statistical assessment, the significance level was considered as 0.05.

Results

The majority of the patients were male (91.1%), married (80%), nuclear family (63%), literate (69%), and had a low- socioeconomic status (51.1%). Their mean age was 67.1±10.5 years old (min: 40–max: 90). Most of the patients had comorbid illnesses (64.4%), 44.4% underwent regular check-ups and 44.4% were receiving long-term oxygen therapy (LTOT) at home. Lastly, most of the patients had a history of smoking (54.23±4.16 years [min: 10- max: 300]); and of these patients, 12.2% were active smokers.

The COPD patients' perception of dyspnea and their coping methods are given in Table 1. When the patients were asked what they felt at the time they were experiencing dyspnea, the feelings most expressed by the patients were fear of breathlessness (70.0%), fear of asphyxiation (37.7%) and fear of death (36.6%). A total of 53.4% of the patients stated that they felt confident in managing dyspnea.

In the assessment of the data to examine objective and subjective manifestations of dyspnea, it was found that the patients had an average pO₂ of 57.4±17.05, an average pCO₂ of 48.3±15.83, an average FEV₁/FVC of 59.9±15.42, an average FEV₁ of 50.6±21.84, and an average MRCS of 3.1±1.37.

Regarding the HADS values of the COPD patients, the average anxiety score was 7.42±4.43 (min: 0–max: 20), and the average depression score was 8.85±4.23 (min: 3–max: 18). A total of

Table 1. COPD patients' perception concerning dyspnea life and methods of dealing with (n=90)

Characteristics	n	%
Meanings given to breath (n=90)		
Life, living, comfort, essential	61	67.8
An emotion experienced for a long-time	7	7.8
Can't be described	22	24.4
Emotions associated with description of breathlessness (n=90)		
Fear/fright	63/90	70.0
Choking	34/90	37.7
Feeling of impending death	33/90	36.6
Enervation	26/90	28.8
Hopelessness	22/90	24.4
Feeling of crying	22/90	24.4
Feeling of a rubber-band pulling at chest	21/90	23.3
Guilt	16/90	17.7
Burning sensation in the chest	11/90	12.2
Disappointment	10/90	11.1
Numbness	8/90	8.8
Competences in the management of dyspnea (n=90)		
Sufficient	48	53.4
Insufficient	22	24.4
Partially sufficient	20	22.2

Table 2. Hospital Anxiety and Depression Scale (HADS) Scores

Sub-Dimensions of Scale	Normal range	n (%)
HAD-A Sub-dimension		
Risk of anxiety ↓	0–10	66.0 (73.3)
Risk of anxiety ↑	11–21	24.0 (26.7)
HAD-D Sub-dimension		
Risk of depression ↓	0–7	39.0 (43.3)
Risk of depression ↑	8–21	51.0 (56.7)
Average anxiety score (SD)	7.42 (4.43)	
	(min: 0–max: 20)	
Average depression score (SD)	8.85 (4.23)	
	(min: 3–max: 18)	

HAD: Hospital Anxiety Depression; SD: Standard deviation.

26.7% of the patients had anxiety symptoms and 56.7%, depression symptoms (Table 2).

The relationship between the objective and subjective values of dyspnea and HADS subscales is shown in Table 3, where it can be seen that there were statistically significant relationships between anxiety and MRCS, depression and MRCS, anxiety and depression, and MRCS and FEV₁ (p<0.01). There was also a significant correlation between depression and FEV₁, MRCS and FEV₁/FVC (p<0.05). A negative correlation was found between pO₂ and anxiety and depression, but this correlation was not statistically significant (p=-0.065, p=-0.046)

Explanatory factors were evaluated through logistic regression analysis (Table 4), the results of which showed that from among the patients, those who had indicated that they had severe dyspnea, a history of psychiatric illness, or depression symptoms had a 22.75 times, 4.304 times, and 17.528 times higher risk, respectively, for anxiety symptoms. The risk for anxiety symptoms of the patients who had not been hospitalized was 20.83 times higher than that of the patients who had been hospitalized one or two times within the recent year.

Factors affecting the risk for depression symptoms were evaluated by logistic regression analysis (Table 5). From this analysis, it was found that there was a greater risk of depression (5.957 times) among the patients who suffered from severe dyspnea than from among the patients with mild dyspnea; a 22.181 times greater risk of depression in patients who had been admitted to a hospital three or more times, and a 12.352 times greater risk in patients who had been admitted one or two

times a year than in patients who had never been admitted to a hospital. Furthermore, there was a 28.712 times greater risk of depression in patients who did not have social support than in patients who did have it, and a 23.294 times greater risk for depressive symptoms among the patients who had symptoms of anxiety than among the patients who did not.

Discussion

In this study, an investigation was made of the relationship between levels and perceptions of dyspnea among COPD patients and their anxiety and depression levels. In confirmation of the study's hypothesis, it was found that both anxiety and depression symptoms increased as the level and perception of dyspnea increased (p<0.01). This, in effect, shows that high levels of anxiety and depression were associated with dyspnea.

A significant relationship between levels of anxiety and FEV₁ has already been reported.^[14,16] Previous studies have shown that patients who had been admitted to the emergency room with an acute attack had higher levels of anxiety symptoms.^[14,27] In this study, patients reported both a sense of breathlessness and intense anxiety of death. Furthermore, a negative weak correlation was found between anxiety and FEV₁ level, but it was not statistically significant (r=-0.061, p>0.05). A number of studies in the literature support these findings.^[20,28]

Regarding the relationship between anxiety and MRCS, a highly significant positive relationship was observed (r=0.505, p<0.01). Results from the completion of the regression analyses carried out according to the subjective data on dyspnea showed that there was a 22.754 times greater risk of anxiety (95% CI: 2.392–216.461) in the patients with severe dyspnea than in the patients who suffered from mild dyspnea. In other words, when patients' perception of dyspnea increases, their anxiety symptoms increase, too. Similarly, the literature reports that the perception of dyspnea is more prevalent among individuals with high anxiety.^[28,29] This finding is consistent with a previous study.^[28,29] The views of two patients whose statements support this finding are given below:

"A complete loss of personal freedom, and now I can't walk, I can't do anything because of dyspnea." (Experience of a patient who was diagnosed with mild COPD).

"I don't have an appetite and I'm losing weight due to inactivity from shortness of breath." (Experience of a patient who was diagnosed with moderate COPD).

Table 3. Relationship Between HADS Sub-dimensions and objective and subjective values of dyspnea (n=90)

	pO ₂	pCO ₂	FEV ₁ /FVC	FEV ₁	MRCS	HAD-A
Medical Research Council Scale	-0.194	0.195	-0.292*	0.477**	-	-
Hamilton Anxiety Depression Scale-Anxiety	-0.065	0.028	-0.184	-0.061	0.505**	-
Hamilton Anxiety Depression Scale-Depression	-0.046	-0.016	-0.197	-0.250*	0.522**	0.493**

*p<0.05, **p<0.01. HAD-A: Hamilton Anxiety Depression Scale-Anxiety; MRCS: Medical research Council Scale.

Table 4. Logistic regression analysis where risk of anxiety was taken as a dependent variable

Variable	β	p	OR	95% CI
Medical Research Council Scale				
Mild dyspnea*				
Moderate dyspnea	2.026	0.080	7.580	0.786–73.
Severe dyspnea	1.750	0.156	5.757	0.512–64.674
Very severe dyspnea	3.125	0.007	22.754	2.392–216.461
The number of hospitalizations over the last year				
Never*				
1–2 times	-3.037	0.009	0.048	0.005–0.474
≥3 times	-2.107	0.087	0.122	0.011–1.363
The presence of psychiatric history				
Yes*				
No	1.460	0.046	4.304	1.026–18.060
High risk of depression				
Not*				
Yes	2.864	0.004	17.528	2.432–126.337

*Reference.

Table 5. Logistic regression analysis where risk of depression was taken as a dependent variable

Variable	β	p	OR	95% CI
Medical Research Council Scale				
Mild dyspnea*				
Moderate dyspnea	-0.041	0.957	0.960	0.215–4.294
Severe dyspnea	1.785	0.066	5.957	0.888–39.967
Very severe dyspnea	0.541	0.521	1.717	0.330–8.936
The number of hospitalizations over the last year				
Never*				
1–2 times	2.514	0.004	12.352	2.257–67.602
≥3 times	3.099	0.004	22.181	2.705–181.875
Social support				
Yes*				
Not	3.357	0.035	28.712	1.277–645.415
High risk of anxiety				
Not*				
Yes	3.148	0.002	23.294	3.255–166.690

*Reference.

These findings show that in addition to objective evaluations, subjective evaluations of dyspnea are important too, and that perceptions of dyspnea may be different for each patient and therefore influence the level of anxiety. Dowson (2001) found that patients experienced anxiety during dyspnea and reported that perception of dyspnea was more prevalent among the individuals with high anxiety.^[30]

In conclusion, the evaluation of the relationship between level and perception of dyspnea and anxiety found that the perception of dyspnea significantly affects the level of anxiety. This suggests that patients would benefit from professional psychological support.

Another significant finding from the study was that the depression level increased as perceived dyspnea increased. A highly significant positive relationship was observed between depression and MRCS ($p < 0.01$). Depression is known to be a factor affecting dyspnea. Studies carried out on COPD patients have emphasized that negative emotions affected the perception of dyspnea.^[4,28] Dyspnea and physical limitations lead to depression due to feelings of inadequacy, changes experienced in role performance, and withdrawal from social and business lives. Therefore, the way patients perceive dyspnea is very important. The higher the patient's perception of dyspnea, the more likely the patient will experience depression. The

present study has shown that there is a greater risk of depression (5.957 times greater) in the patients who suffer from severe dyspnea than in the patients with mild dyspnea. Although this finding was not statistically significant, the risk was shown in some cases to be up to 39.967 times greater ($p=0.06$). This shows that the higher level of depressive symptoms also increases the perception of dyspnea. As stated above, factors such as physical limitations, change in role performance, and withdrawal from work and social life, may lead to depression in individuals with dyspnea.

According to the MRCS assessment (subjective evaluation), the following statements from the patients who were determined to have moderate and severe dyspnea revealed that physical limitations led to mental distress. The views of two patients whose statements support this finding are given below:

"How i wish i could walk (again), but i just cannot as i cannot breath properly. I even cannot move to the armchair opposite, i feel okay only when i sit on a chair. O have been outside only once for the last six months" (Experience of a patient who was diagnosed with very severe COPD).

"In the past i could go anywhere by car, i used to take my nebulizer with me. However, i cannot carry with me this cursed machine (O_2 comcentrator). What is more, it makes a lot of noise, my wife cannot sleep due to that. I am fed up with this life, i am imprisoned at home." (Patient diagnosed with moderate COPD).

Looking at the relationship between depression and FEV_1 , a negative correlation was found. The patients' average FEV_1 value in this study was determined to be 50.6 ± 21.84 . The majority of the COPD patients were included in the stage III (severe stage, where the FEV_1 value is between 30–49%).

Previous studies have demonstrated that a low level of FEV_1 ,^[5,18] and physical limitations^[14,20] are the causes of depression. Patients with severe COPD had higher rates of anxiety and depression than those of other groups in Marco's study.^[14] Kormurcuoglu et al.^[13] (2000) studied the relationship between blood gas values, pulmonary function tests and depression in male patients with COPD and observed there to be a significant relationship between FEV_1 and depression. Similar findings were also reported in the studies by Atacanli and Dilbaz (2001)^[15] and Ulubay (2009).^[4] While the literature shows a positive correlation between the incidence of depression and stage of disease,^[15,16,20,27] in the present study, there was no statistically significant correlation found. This result could be associated with the limited sample size and with the fact that the patients were for the most part in the same stage of the disease.

Receiving long-term oxygen therapy (LTOT) at home has been reported to be one of the most important factors responsible for the physical limitations of patients with advanced COPD.^[25,29,33] LTOT may lead to feelings of loneliness and hopelessness as a result of social isolation. Patients who are homebound live out their lives dependent on machines. Depressive symptoms may occur in patients who have lost independence. In the

present study, 44.4% of the patients received LTOT at home, a fairly low rate, which can be attributed to the cost of electricity for running the machines, as reported by the patients. The correlation between FEV_1 and depression is associated with these factors.

When the mean scores of the COPD patients from the scales and subscales were assessed, their anxiety level was found to be 26.7%, while their level of depressive symptoms was found to be 56.7% (Table 4). Unlike the results reported in the literature^[21,25,30,31] in the present study, the average scores of anxiety were below the cut-off score. Social support positively affects physical and mental health by meeting the social needs of people, such as love, compassion, and self-respect. Lack of needed support, on the other hand, leads to feelings of uselessness, worthlessness, helplessness and eventually depression.^[13] In one study, it was reported that patients who were living with their families were supported psychosocially.^[32]

The present study found that the anxiety cut-off score was 7.42 ± 4.43 , which was higher than the average depression score. In the literature, the presence of comorbid illness, the presence of dyspnea, smoking, low educational level and low socio-economic status have been shown to be factors responsible for increasing the level of depression symptoms.^[33] Returning to the present study, the patients' levels of depression symptoms may have increased on account of the fact that more than half had a low socio-economic level, 90.0% were unemployed, 30.0% did not work due to illness and 64.4% had a chronic disease other than COPD. A majority (80%) of the patients participating in the present study were married. It is possible that their feeling of responsibility or failure to meet the requirements of married life as a parent and/or spouse may have been the cause of the depression.

Conclusion

According to the results in this study, physical care and medical treatment alone are not sufficient for the patients. In addition to these, a detailed psychological examination should be performed. It is here that the nurses working in the clinics have major responsibility. Short daily assessment forms that evaluate risk factors, as well as routine follow-up forms (blood pressure, pulse, fever, blood gas values, etc.), should be generated for patients who are hospitalized in the chest diseases unit. Monitoring, treatment and care should be provided by the Consultation-Liaison Psychiatry Department for the individuals who at risk for anxiety and depression.

Moreover, objective and subjective assessments of the patients should always be done together. Based on the results of the present study, individuals who have a high perception of dyspnea carry a high risk for anxiety as well as depression, and this functions inversely as well, where patients who experience anxiety and depression will experience more severe dyspnea. The perceptions of the patients may change when they are informed and learn about different coping methods. The

“educative role” of nurses, which is one of the modern roles of nursing, is important, not only in maintaining and improving health, but also in the rehabilitation of chronic diseases. It is likely that dyspnea experiences and dyspnea perceptions of COPD patients would be decreased and their mental health would be improved if they were given education about dyspnea management by the nurses who are experienced in pulmonary rehabilitation.

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