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# The evaluation of psychological status in newly diagnosed chronic obstructive pulmonary disease patients

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## Abstract:

**BACKGROUND:** As chronic obstructive pulmonary disease (COPD) and its symptoms may change psychological attributes, psychiatric disorders may be seen in COPD.

**AIMS:** We aimed to assess the effect of taking diagnosis of COPD and using bronchodilator therapy on the psychological status of COPD patients.

**MATERIALS AND METHODS:** It is a cross-sectional study including newly diagnosed COPD outpatients. Spirometry, Hospital Anxiety and Depression Scale (HADS), Beck Depression Inventory (BDI), and St. George's Respiratory Questionnaire (SGRQ) were performed at the first visit (date of new diagnosis) and 6 months later as the second visit.

**RESULTS:** Ninety new diagnosed COPD patients (71 men and 19 women) with a mean age of  $61.7 \pm 9.8$  were included. There were high scores of anxiety in 23.5% and depression in 38.2% (HADS)–52.9% (BDI) patients at the first visit. The symptoms about anxiety reduced to 19%, depression to 33.3% (HADS)/47.6% (BDI) six months later. All the participants who were active smokers had lower spirometric levels (42.9%) at the second visit compared with the first visit levels. There was an improvement in psychological status and quality of life (QOL) ( $P < 0.001$ ). There was a negative correlation between SGRQ score and forced expiratory volume in 1 s levels ( $P = 0.045$ ) and positive correlation of SGRQ score with HAD and BDI scores ( $P = 0.041$  and  $0.011$ ). Participants who quit smoking in 6-month period had statistically lower anxiety and depression scores ( $P = 0.003$  and  $0.026$ ).

**CONCLUSION:** Depression and anxiety states are frequent among COPD patients. Pulmonary symptoms may regress with the bronchodilator therapy at newly diagnosed COPD patients, which can cause an improvement in pulmonary functions, psychological status, and QOL. Psychological aspects need to be carefully assessed in patients with new diagnosis of COPD.

## Keywords:

Anxiety, chronic obstructive pulmonary disease, depression

## Introduction

Depression and anxiety are common mental health problems that may occur frequently in chronic diseases, such as chronic obstructive pulmonary disease (COPD).<sup>[1]</sup> Many patients with COPD experience had the symptoms of anxiety and depression.<sup>[2]</sup> The cause of these symptoms is likely to be multifactorial in COPD patients.

Dyspnea, which is a clinical term used to describe the subjective feeling of impaired breathing, is the most common presenting complaint in COPD. The relationship between psychological factors and dyspnea is complicated. Dyspnea may cause and induce psychiatric disorders;<sup>[3]</sup> on the other hand, psychological illnesses may increase the perception of dyspnea's subjective sensation.<sup>[3]</sup> Besides, depressive symptoms may occur due to dyspnea, social isolation, and decline of physical activity.<sup>[4]</sup>

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COPD patients may also describe dyspnea with symptoms of anxiety.<sup>[5]</sup> The feeling of breathlessness may trigger anxiety and result in a panic attack. The link between breathlessness, anxiety, and panic attacks can also increase social isolation for a person with COPD. The great concern about walking a long distance or climbing the stairs may cause the feeling of anxiety, which has been linked to greater disability and increasing level of breathlessness.<sup>[6]</sup>

The presence of comorbidities, especially having a newly diagnosed chronic disease may trigger the duration of depressive episodes and may cause depression in patients. The presence of a progressive and incurable lung disease may lead the patients to the feelings of depression. Health problems and reduced quality of life (QOL) can negatively affect the psychological status. Factors such as the restriction of activities, limitation of social life, continuous usage of inhaler vehicles, oxygen, and the presence of exacerbations may cause an anxious in depressive mode in COPD patients.<sup>[1]</sup>

There is a wide prevalence interval of depression in COPD, which changes from 7% to 80%.<sup>[7]</sup> If COPD and depression stay untreated, it can negatively affect the ability to keep happiness and QOL. COPD patients with depression are known to have a higher rate of exacerbations and worse survival.<sup>[8]</sup>

We aimed to assess the effect of taking diagnosis of COPD and using bronchodilator therapy on the psychological status of COPD patients.

## Materials and Methods

This cross-sectional study includes outpatients who were newly diagnosed as COPD and started to use a bronchodilator therapy between January 2014 and July 2014 in pulmonology polyclinics of study centers were included.

All patients underwent a postbronchodilator standard spirometry. Forced expiratory volume in 1 s (FEV<sub>1</sub>), forced vital capacity (FVC), and FEV<sub>1</sub>/FVC were determined with a portable spirometry (spirolab III S/N A23-053, Rome-Italy) according to American Thoracic Society criteria were recorded.<sup>[9]</sup> The diagnosis of COPD was confirmed when the postbronchodilator FEV<sub>1</sub>/FVC ratio was <70%. The new classification system combining the symptomatic assessment with the patient's spirometric values and/or the number of COPD exacerbations was used for COPD classification.<sup>[10]</sup>

There were two visits with each patient in a period of 6 months. Demographic variables and medical history were recorded at the first visit. Spirometry, Medical Research Council (MRC) Dyspnea Scale, Hospital Anxiety and Depression Scale (HADS), Beck

Depression Inventory (BDI), and St. George's Respiratory Questionnaire (SGRQ) were performed. The patients completed MRC, HADS, BDI, and SGRQ again 6 months later at the second visit.

MRC Dyspnea Scale assesses whether there is any limitation in walking considered with a normal person.

HADS is a self-report scale with 14 questions to determine the risk of anxiety and depressive states among medical patients.<sup>[11]</sup> Each question has a four-point response category (0-3); so, the possible scores range from 0 to 21 for anxiety and 0-21 for depression. A score of 11 or higher is a valid case for anxiety while it is 8 or higher for depression.

BDI is a self-report questionnaire with 21 multiple choice questions regarding depression symptoms. This instrument has been validated for use in Turkey with a cutoff score of 17 significant for depression.<sup>[12]</sup>

The SGRQ is a disease-specific QOL assessment tool used in COPD.<sup>[13]</sup> The questionnaire includes the parts measuring symptoms, activity limitation, and social and emotional impact of the disease. Scores are expressed as percentages of the maximally possible sum of weights. Overall scores range from 0 to 100; a score of zero represents no health impairment and a score of 100 means maximal health impairment. The validated Turkish version of the questionnaire was used.<sup>[14]</sup>

Inhalation therapy adherence of the participants was evaluated with a scoring system. The bronchodilator usage performance was standardized according to the "National Guide of Turkish Thoracic Society for Asthma" [Appendix S1],<sup>[15]</sup> and a scoring system was created with the help of some previous reports about this subject.<sup>[16]</sup> The time, dosage, and frequency of bronchodilators in 1 day were also recorded. The scoring system for evaluating inhalation therapy success is as follows: the correct use of inhaler therapy, 5 points [every step in Appendix S1 equals 0.5 points; if there were more than one inhaler device used, the mean of all inhaler therapy points was used]; the correct time use in 1 day, 2 points (if no: 0 point); the correct dose of the therapy in 1 day, 2 points (if no: 0 point); and regular use of the therapy, 2 points (if no: 0 point).

The Ethics Committee of the Medical Faculty of Çanakkale Onsekiz Mart University approved the study. Written informed consent was obtained from all of the patients.

The patients with a history of COPD, asthma, psychiatric disorder, and treatment including psychiatric drugs were excluded.

The statistical analyses were performed using Statistical Package for Social Science (SPSS) for Windows (version

13.0 SPSS Inc., Chicago, IL, USA). The mean was used to present the results according to the data distribution. Mann–Whitney U-test was used for comparison of two groups. The Pearson correlation was used to investigate the relationship between the variables. The Chi-square test or Fisher’s exact test was used to compare proportions. In all tests,  $P < 0.05$  was considered as statistically significant.

## Results

### The characteristics of the chronic obstructive pulmonary disease patients

Ninety newly diagnosed COPD patients, 71 men (78.8%) and 19 women (21.2%), with a mean age of  $61.65 \pm 9.76$  were included.

The majority of the patients were in Group A (50%) according to the combined assessment of COPD in GOLD 2011.<sup>[5]</sup> There were 16 patients (17.8%) in Group B, 19 (21.1%) in Group C, and 10 (11.1%) in Group D.

Forty-nine of 90 patients (54.4%) were still smoking while 35 patients (38.9%) had quit smoking. Six patients declared no smoking history.

There were other comorbidities in 37 (41.1%) patients. Dyslipidemia was the most common comorbidity.

There was an improvement in psychological status and QOL after 6 months ( $P < 0.001$ ) [Table 1].

### Prevalence of psychiatric symptoms

Tests about anxiety and depression revealed higher scores in 23.5% and in 38.2% (according to HADS)–52.9% (according to BDI) of COPD patients at the first visit.

The symptoms of anxiety reduced to 19%, depression to 33% in HADS, and 47.6% in BDI at the second visit [Figure 1]. The changes in psychiatric symptoms are in Figures 2 and 3.

Participants who quit smoking in 6-month period had statistically lower anxiety–depression scores ( $P = 0.003$  and  $0.026$ ).

Besides, we could not find a relationship between anxiety–depression scores and gender, groups of COPD, hospitalizations, or exacerbations ( $P = 0.33, 0.756, 0.574,$  and  $0.101$ ; anxiety and  $P = 0.203, 0.286, 0.541,$  and  $0.053$ ; depression).

Participants without any comorbidities had lower anxiety scores at the second visit ( $P = 0.042$ ).

### Change in spirometric parameters

There was an improvement in spirometric parameters (FEV1 and FVC) in 57.1% of patients at the second visit. FEV1 and FVC levels were significantly higher in patients who quit smoking after the first visit ( $P = 0.035$  and  $0.025$ ). All the participants with lower spirometric levels (42.9%) were still smoking.

### Pulmonary symptoms and change in the quality of life

Dyspnea was the most frequent respiratory symptom (32.2%). About 65% of patients had a lower MRC score after 6 months of COPD treatment. The patients

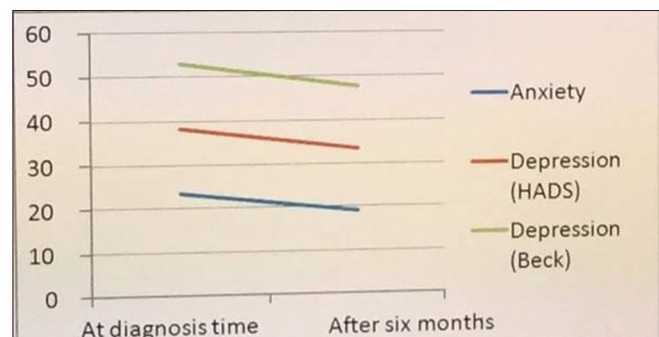


Figure 1: Changes in psychiatric symptoms after 6 months

Table 1: Results of linear regression analysis for the independent parameters affecting the increase of anxiety symptoms

Model	Unstandardized coefficients		Standardized coefficients ( $\beta$ )	t	Significant
	B	SE			
Constant	0.819	0.882		0.929	0.362
Age	-0.012	0.010	-0.215	-10.225	0.232
Sex	0.156	0.334	0.088	0.467	0.644
mMRC score	0.051	0.117	0.086	0.435	0.667
FEV <sub>1</sub> %	0.000	0.006	-0.011	-0.051	0.960
Smoking status	-0.017	0.174	-0.019	-0.098	0.923
SGRQ score	0.003	0.008	0.081	0.393	0.698
The presence of pulmonary symptoms	0.161	0.238	0.137	0.678	0.504
The presence of COPD exacerbations	0.621	0.242	0.502	20.565	0.017
Inhaler adherence score	-0.071	0.000	-0.025	-0.131	0.897

COPD: Chronic obstructive lung disease, FEV<sub>1</sub>: Forced expiratory volume in 1 s, SGRQ: St. George’s Respiratory Questionnaire, mMRC: Modified Medical Research Council, SE: Standard error

with less MRC score had lower scores of anxiety and depression at the end of 6 months, which was statistically significant ( $P = 0.045$  and  $0.024$ ).

Our results revealed an improvement in the QOL according to SGRQ in 68.1% of participants (10.6%: a decrease in QOL and 21.2%: no change).

There was a negative correlation between FEV1 levels and SGRQ score ( $P = 0.045$ ) and positive correlation of SGRQ score with HAD and BDI scores ( $P = 0.041$  and  $0.011$ , respectively).

### Change in inhalation adherence

There was no relationship between inhalation adherence score and anxiety or depression score at the end of 6 months ( $P = 0.155$  and  $0.057$ , respectively).

### Linear regression analysis

Multiple linear regression analysis revealed that the presence of COPD exacerbation in 1 year was the independent parameter which was related with the increase of anxiety and depressive symptoms ( $P = 0.017$  and  $0.034$ , respectively) [Tables 1 and 2].

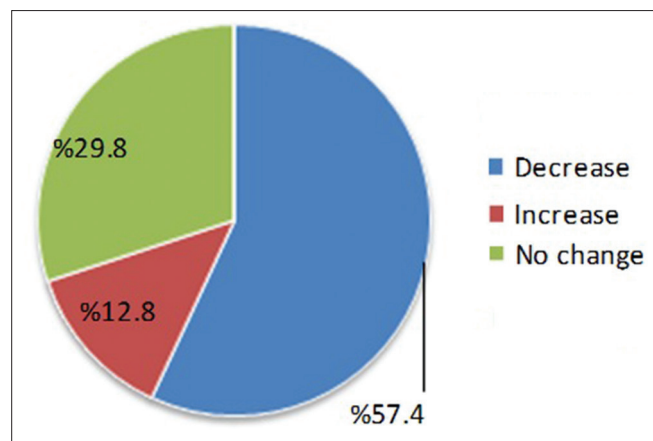


Figure 2: Changes in symptoms of anxiety after 6 months

## Discussion

The relationship between COPD and the presence of anxiety and depression has been investigated several times. The prevalence of clinically relevant anxiety has been found between the varying rates of 2%–96%, while the rates of depression varied between 7% and 42%.<sup>[17,18]</sup> Our study revealed high scores of anxiety (23.5%) and depression (38.2%–52.9%), which is similar to other studies in literature.<sup>[1,17,18]</sup>

The high rates of depression and anxiety symptoms may be related to many factors in COPD. Smoking, a decrease in QOL, and the presence of some comorbidities (such as cardiovascular) are known to belong to these factors.<sup>[19]</sup>

Smoking is one of the most important characteristics that may affect the presence and prevalence of psychiatric disorders. Some studies showed that COPD patients who suffered from depression and anxiety were more likely to be active smokers.<sup>[20,21]</sup> The factors which contribute to smoking may also predispose to anxiety and depression.<sup>[17]</sup> For this reason, smoking cessation may improve mental health. It was reported that the cessation of smoking reduced the rates of anxiety.<sup>[22]</sup> Taylor

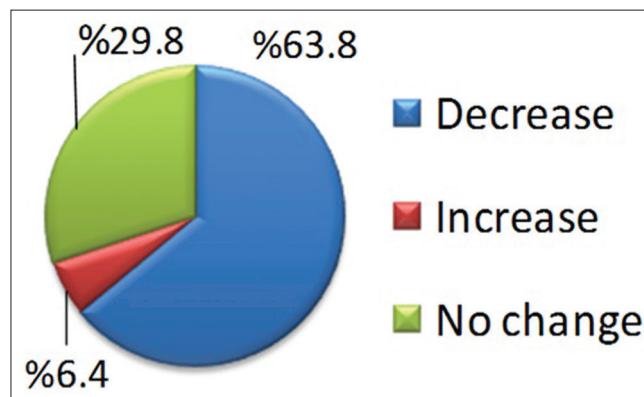


Figure 3: Changes in depressive symptoms after 6 months

Table 2: Results of linear regression analysis for the independent parameters affecting the increase of depressive symptoms

Model	Unstandardized Coefficients		Standardized coefficients ( $\beta$ )	t	Significant
	B	SE			
Constant	1.077	0.864		1.247	0.224
Age	-0.016	0.010	-0.285	-1.639	0.114
Sex	0.164	0.327	0.094	0.500	0.621
mMRC score	-0.013	0.115	-0.022	-0.111	0.912
FEV <sub>1</sub> %	0.000	0.006	0.001	0.007	0.995
Smoking status	-0.010	0.171	-0.011	-0.056	0.956
SGRQ score	0.009	0.008	0.236	1.148	0.262
The presence of pulmonary symptoms	-0.006	0.233	-0.005	-0.027	0.979
The presence of COPD exacerbations	0.532	0.237	0.434	2.243	0.034
Inhaler adherence score	1.743	0.000	0.014	0.076	0.940

COPD: Chronic obstructive lung disease, FEV<sub>1</sub>: Forced expiratory volume in 1 s, SGRQ: St. George's Respiratory Questionnaire, mMRC: Modified Medical Research Council, SE: Standard error

*et al.* specified the decrease of anxiety and depression, with improvement in the QOL in patients who quit smoking.<sup>[23]</sup> Our study revealed a significant relationship between the regression of anxiety–depression scores and cessation of smoking after the diagnosis of COPD, which shows the importance of smoking cessation in COPD patients.

SGRQ score, which was negatively correlated with spirometric values, had a positive correlation with HAD and BDI scores in our study. Symptoms of anxiety have been demonstrated to impact on disease-specific health-related QOL.<sup>[17]</sup> Depression has also a significant impact on QOL in patients with COPD.<sup>[24]</sup> Besides, it has been a better predictor of reduction in FEV1 levels.<sup>[25]</sup> Improvement in the psychological status of newly diagnosed COPD patients may affect spirometric values and QOL positively.

Dyspnea, which is known to be the most common symptom of COPD, may also catalyze some psychiatric disorders.<sup>[26]</sup> On the other hand, it may also occur due to anxiety and depression. Dyspnea was reported to be higher in depressive patients.<sup>[16]</sup> Pulmonary symptoms may regress after bronchodilator therapy at newly diagnosed COPD patients, which may cause an improvement in psychological status. The patients with less MRC score had lower scores of anxiety and depression in our study, which is supporting this fact.

Anxiety and depression are known as the most common but least-diagnosed and treated comorbidities of COPD.<sup>[19]</sup> Comorbidities such as depression which may be associated with poor health status and prognosis in COPD patients according to GOLD 2011, are often underdiagnosed.<sup>[27]</sup> The factors such as increased dyspnea, physical inactivity, social isolation, and long-term oxygen treatment may predispose to anxiety and depressive disorders in end-stage COPD.<sup>[18]</sup> Although dyspnea is the most common early symptom experienced by COPD patients and a major cause of anxiety about the disease, symptoms of anxiety and depression are not generally questioned in newly diagnosed COPD patients. As the presence of depression may decrease the tolerance to the disease,<sup>[18]</sup> the patients are needed to be carefully identified about it. Our study demonstrated a high rate of anxiety and depression symptoms which cannot be underestimated. It demonstrates that asking questions regarding the presence of anxiety and depression in newly diagnosed COPD patients is important.

Our study has some limitations. First of all, there may be many reasons that can affect the psychological status of the patients. It is hard to exclude all other factors affecting the psychological status and be sure that the presence of anxiety and depression symptoms is due to COPD and

dyspnea, which seems to be another limitation. Besides, it is a cross-sectional study including COPD patients with a new diagnosis who applied to our clinics. A study with more patients and more centers will be more objective and has more reliable results about this subject.

## Conclusion

- Depression and anxiety states are frequent among COPD patients
- Pulmonary symptoms may regress with the bronchodilator therapy at newly diagnosed COPD patients, which can cause an improvement in pulmonary functions, psychological status, and QOL. Psychological aspects need to be carefully assessed in patients with new diagnosis of COPD
- Anxiety and depression have to be evaluated not only in end-stage COPD but also in newly diagnosed COPD patients. Psychological aspects need to be carefully assessed in patients with new diagnosis of COPD.

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Nil.

## Conflicts of interest

All contributing authors complete the FCMJE form.

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#### Appendix S1: Steps of the usage of inhalation therapies

Steps of inhaler therapies	MDI	DH	TH	A/HH
1	Remove cap	Open diskhaler	Open turbuhaler	Open aerolizer/handihaler
2	Shake the inhaler	Perforate blister	Hold inhaler upright	Insert capsule
3	Hold inhaler upright	Keep head upright or slightly tilted	Rotate grip and back until "Click"	Close aerolizer/handihaler
4	Keep head upright or slightly tilted	Exhale to residual volume	Keep head upright or slightly tilted	Perforate capsule
5	Exhale to residual volume	Mouthpiece between teeth and lips	Exhale to residual volume	Exhale to residual volume
6	Mouthpiece between teeth and lips	Inhale forcefully and deeply	Mouthpiece between teeth and lips	Exhale away from the mouthpiece
7	Inhale slowly and press canister	Take the device out of your mouth	Inhale forcefully and deeply	Mouthpiece between teeth and lips
8	Continue slow and deep inhalation	Hold breath for 5-10 s	Hold breath for 5-10 s	Inhale forcefully and deeply
9	Hold breath for 5-10 s	Exhale away from the mouthpiece	Exhale away from the mouthpiece	Hold breath for 5-10 s
10	Close inhaler	Rotate disc	Close turbuhaler	Exhale away from the mouthpiece

MDI: Metered-dose inhaler, DH: Diskhaler, TH: Turbuhaler, A/HH: Aerolizer/handihaler