






Prevalence and Associated Depression Risk Factors in Patients with Chronic Obstructive Pulmonary Disease in Qazvin, Iran (2014)

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ABSTRACT

Objective: The prevalence of depression in patients with chronic obstructive pulmonary disease (COPD) varies from country to country, and even across various geographic regions within a country. The aim of this study was to determine the prevalence of depression and its related risk factors in patients with COPD in Qazvin, Iran.

Methods: This cross-sectional study included 100 patients (34–80 years old) with COPD, referred to the pulmonary diseases clinic in Qazvin, Iran, during 2014. Demographics, medical records, current symptoms, and results of the lung function tests of the participants were recorded. Moreover, the pulmonary function was evaluated. COPD was categorized according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) system. The Beck depression inventory (BDI) was completed by all participants. Data were analyzed using the independent samples t-test, chi-squared test, and linear regression analysis.

Results: Of the 100 patients with COPD, 90 were male. The mean age was 57.57 ± 14.06 years. Moreover, among the 100 patients with COPD, 75 had depression. 67% had symptoms of mild to moderate depression, and only 8% had severe depressive symptoms. There was a significant association between depression and independent variables of cigaret smoking (β , 0.384; $p < 0.05$), body mass index (BMI; β , -0.383 ; $p < 0.05$), and one-second forced expiratory volume (FEV1; β , -0.264 ; $p < 0.05$).

Conclusion: The prevalence of depression in patients with COPD was high in this study. Smoking, BMI, and FEV1 were associated with depression. Effective interventions should be developed to address this clinical concern.

Keywords: Body mass index, chronic obstructive pulmonary disease, depression, smoking

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a progressive disease with a prevalence of 5%–13% (1, 2). COPD is characterized by symptoms such as dyspnea and limited airflow reversibility (3). In some patients, systemic manifestations progress and result in the disruption of peripheral muscle function, exercise limitation, and malnutrition (1, 4). The documents show that approximately 5% of the world's population is affected by the disease. In 2012, the disease was the third most common cause of mortality and morbidity in the world (5). According to researchers' predictions, COPD is expected to become the second cause of mortality and morbidity, and in terms of burden, the world's

fifth-highest ranking disease by 2020 (6, 7). The burden of this disease is now higher in Asian countries than in Western developed countries. This seems to be related to tobacco exposure and the indoor and outdoor air pollution in Asian countries (8). If intervention is not taken to reduce the COPD risk, the mortality rate is projected to increase by 30% in the next decade (9).

Chronic obstructive pulmonary disease affects mental health significantly because of its effect on sleep and social life (10). Patients with COPD develop depression during their illness, and their daily activities are severely impaired due to chronic psychological stress, physical pain, and frequent hospital admission. De-

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pression is one of the factors that worsen social performance and the quality of life, and it is associated with dyspnea and disease progression (11, 12).

Depression is a major global public health problem. The disease is often associated with other chronic diseases. The impact of depression on COPD is a complex and bi-directional issue.

It is believed that depression indirectly contributes to the development of COPD because depressed people are less likely to quit smoking (13, 14). The presence of depression in chronic illnesses exacerbates the adverse effects of these diseases and leads to noncompliance with treatment, loss of disease control, lower quality of life, increased use of health resources, and increased mortality and morbidity.

The combination of these two diseases in the coming decades can create significant health problems for individuals and society (7); thus, the diagnosis of depression in patients with COPD is of great importance. Information on the prevalence of depression varies from country to country, and even across geographic regions within a country. Systematic reviews on various studies have failed to make a conclusion (6, 15). In addition, depression in patients with COPD leads to more health care use and admission, as well as to further return of patients to emergency rooms, resulting in high economic burden. Therefore, screening and timely treatment of the symptoms of depression in these patients are very important. The aim of this study was to determine the prevalence of depression and its related risk factors in patients with COPD in Qazvin, Iran.

METHODS

This cross-sectional study was conducted on 100 patients (34–80 years old) with COPD referred to the pulmonary diseases clinic in Qazvin, Iran, during 2014. The study was confirmed by the ethics committee of the Qazvin University of Medical Sciences (decision no: 796, date: 2013.11.23). The study participants gave their written informed consent.

The inclusion criterion was the COPD diagnosis confirmed by a single pulmonary diseases subspecialist. The exclusion criteria were asthma or any chronic pulmonary disorder other than COPD; COPD exacerbation; and confirmed mental illness.

The COPD diagnosis was based on the criteria provided by the American Thoracic Society and European Respiratory Society (16). For this purpose, medical records, current symptoms, and results of the lung function tests of the participants were used. The pulmonary function was evaluated by the spirometer model 701. COPD was categorized according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) system based on the one-second forced expiratory volume (FEV₁) (17).

Demographics were recorded. The Beck depression inventory (BDI) was completed by all participants. Beck's questionnaire includes 21 four-choice items, in which each choice in the range of 0–3 shows the highest severity of depression. The questionnaire has a maximum score of 63, in which the score of 0–15 indicates

normal status, 16–30 mild depression, 31–46 moderate depression, and 47–63 severe depression (10, 18).

Statistical Analysis

The data were presented using the frequency and percentage for categorical variables and the mean±standard deviation for continuous variables. An independent t-test was used to compare the continuous variables, while the chi-squared test was used to compare the categorical variables. Linear regression was used to investigate the relationship between depression and several explanatory variables. Then, a multiple linear regression analysis was used to investigate the relationship between all the risk factors and depression. In both the regression models, the independent variables included gender, body mass index (BMI), age, work status, occupational exposure to airborne particles, cigarette smoking, and age at the COPD onset, FEV₁, COPD duration, family history, education level, and the GOLD stage. All the statistical analyzes were performed using the Statistical Package for the Social Sciences software version 19 (SPSS IBM Corp.; Armonk, NY, USA). A $p < 0.05$ was considered to be statistically significant.

RESULTS

Of the 100 patients with COPD, 90 were male. The mean age was 57.57 ± 14.06 years. There was only one young patient (a 34-year-old man) who was a heavy smoker from the age of 14. However, genetic deficiency was ruled out in this particular case by measuring alpha-1 antitrypsin. Table 1 shows the demographic and clinical characteristics of patients. The groups with an education level less than 12 years and illiteracy had the highest frequency. The highest frequency of work status was related to unemployed patients and workers. The mean BMI was 22.28 ± 4.27 kg/m². Among the 100 patients, 16 (16%) were underweight, and 11 (11%) were obese. Moreover, 69% of the patients with COPD had a history of smoking. COPD was severe or very severe in 46% of the patients based on the GOLD criteria. Only age was significantly different between the male and female patients ($p < 0.05$).

In addition, 75% of patients with COPD had depression. Table 2 shows the relationship between the COPD severity and depression. Of the 100 patients, 67% had symptoms of mild to moderate depression, and only 8% had severe depressive symptoms. The mean BDI score among the patients was 15.45, 25.79, 27.25, and 33 in the GOLD Stages I, II, III, and IV, respectively. It was also found that with increasing COPD severity of, the mean depression score increased as well.

The results of the linear regression analysis are presented in Table 3. There was a significant and negative association between depression and the independent variables of FEV₁ and BMI ($p < 0.05$). On the other hand, depression had a positive relationship with cigarette smoking and the GOLD stage ($p < 0.05$). In a multiple regression analysis, the results did not fundamentally change, except for the GOLD stage.

DISCUSSION

The presence of unknown depression in patients with COPD is a challenging issue. Therefore, it is very important to diagnose

Table 1. Demographic and clinical characteristics of patients with chronic obstructive pulmonary disease (COPD)

Variable	Total	Male (n: 90)	Female (n: 10)	p
Age	57.57±14.06	58.77±13.6	46.7±14.11	0.0093
Education level				
Illiterate	37 (37)	34 (38)	3 (30)	0.71
<12 years	38 (38)	35 (39)	3 (30)	
12–14 years	18 (18)	15 (17)	3 (30)	
> 14 years	7 (7)	6 (7)	1 (10)	
Work status				
Unemployed	39 (39)	38 (42)	1 (1)	0.19
Employee	10 (10)	9 (10)	1 (1)	
Self-employed	17 (17)	15 (17)	2 (20)	
Worker	34 (34)	28 (31)	6 (60)	
BMI	22.24±4.77	22.50±4.78	19.9±4.17	0.091
Smoking				
No smoking	31 (31)	27 (30)	4 (40)	0.75
Former smoker	29 (29)	26 (29)	3 (30)	
Current smoker	40 (40)	37 (41)	3 (30)	
GOLD stage				
Mild	11 (11)	11 (12)	0	0.45
Moderate	43 (43)	37 (41)	6 (60)	
Severe	40 (40)	36 (40)	4 (40)	
Very severe	6 (6)	6 (7)	0	
Beck depression score	25.67±13.74	25.15±14.04	30.3±10.13	0.26
COPD duration	9.17±6.26	9.31±6.33	7.9±5.72	0.5
Age at COPD onset	56.52±15.23	56.63±15.58	55.5±12.25	0.82

BMI: body mass index; GOLD: the global initiative for chronic obstructive lung disease; COPD: chronic obstructive pulmonary disease

Table 2. Association between COPD severity and depression

COPD Severity by GOLD	Score	Depression				p
		No	Mild	Moderate	Severe	
Mild	15.45±16.17	8	0	2	1	0.037
Moderate	25.79±14.51	12	10	19	2	
Severe	27.25±9.95	4	28	5	3	
Very severe	33±19.04	1	1	2	3	

COPD: chronic obstructive pulmonary disease

and determine the prevalence of depression in patients with COPD (1). In this study, the prevalence of depressive symptoms in patients with COPD was 75%. In other words, approximately three-quarters of these patients suffered from some degree of depression, which is remarkable and greater than the high prevalence of depression in the general population of the country (20%–30%) (19).

In this study, cigaret smoking, BMI, and FEV₁ were significantly related to depression. However, depression had no significant relationship with age, gender, work status, and the education level.

In Iran, there is little information about the prevalence of depression in COPD patients. In a study by Adeli et al. (20), 83.3% of COPD patients suffered from varying degrees of depression.

Table 3. Linear regression analysis of depression and the independent factors

Variables	Linear		Multiple	
	β	p	β	p
FEV ₁	-0.228	0.022	-0.264	0.021
BMI	-0.37	<0.001	-0.343	0.001
Gender	-0.113	0.264	0.017	0.871
Age	-0.007	0.946	0.058	0.53
Work status	0.012	0.907	-0.084	0.626
Occupational exposure to airborne particles	0.056	0.581	0.019	0.916
Smoking	0.282	0.004	0.384	<0.001
Age at COPD onset	-0.188	0.061	-0.138	0.131
COPD duration	0.061	0.549	0.038	0.67
Family history of COPD	-0.053	0.601	-0.281	0.053
Education level	0.024	0.816	0.046	0.615
GOLD	0.253	0.011	0.009	0.931

BMI: body mass index; GOLD: the global initiative for chronic obstructive lung disease; COPD: chronic obstructive pulmonary disease

The incidence of depressive symptoms varies from 6% to 56% in COPD patients. This prevalence variation can partly be attributed to the use of different scales to examine depression (21, 22).

After the inclusion of all the factors influencing depression in the regression model, other than the GOLD stage, the results did not substantially change, and in both the models, depression was associated with FEV₁, BMI, and smoking. A few studies in Iran have considered all these associations. Different studies in the literature confirm the findings of this study. For example, De et al. (23) showed in a study that depression progressed significantly with the progression of COPD. This finding is consistent with our study.

In the present study, smoking had a direct association with the prevalence of depression in the COPD patients, which is in line with the study of Wagena et al. (24). Research shows that a few minutes after taking the last cigaret, the amount of nicotine in the body begins to decrease, which also causes anxiety in a smoker and has a very close relationship with depression. Thus, permanent changes in the nervous system resulting from the use of cigarets lead to depression that may remain throughout the life of a smoker and is very difficult to overcome (25).

In this study, there was a significant reverse correlation between BMI and depression, as depression was lower in patients with higher BMI. Such a connection has also been shown in other studies (26, 27). In line with previous studies, FEV₁ had an inverse relationship with depression (26, 28). Studies show that increased dyspnea is significantly associated with the development of depressive symptoms. Reduced physical activity due to dyspnea is probably the main cause of these psychological complications (29).

Evidence suggests that low alcohol use has a significant effect on reducing the prevalence of depression (21). In this study, consumption of alcoholic beverages was not included among the variables in the model. The reason for this was the legal prohibition of alcohol in the country and that the participants never mentioned of alcohol consumption.

Contrary to this study, Hanania et al. (30) recognized the female gender as an effective factor in depression. Since only 10% of the patients in this study were female, this could not result in a reliable comparison. In a study by Zhang et al. (7), similar to our study, gender was not considered to be a significant moderator in depression. Moreover, contrary to the current study, in a study conducted by Bhowmik et al. (6), the education level was a risk factor for depression. The reason for this contradiction is the impact of cultural, ethnic, and genetic factors on the lifestyle, which can affect the observed relationships.

One of the strengths of this study, compared to the previous studies, was the use of statistical tests that controlled the confounding factors. In this research, the regression test was used for this purpose. This study had some limitations, including its cross-sectional design and reliance on self-report questionnaire for determining depression; thus, further studies are needed to determine the causal relationship between the factors of the study. Obstructive sleep apnea, which may affect depression, was not evaluated in this study. To achieve a more comprehensive examination, clinical diagnostic criteria need to be used to investigate depression. Moreover, this study examined people living only in one of the cities in Iran. Therefore, these findings cannot be applied to the whole country. To achieve such a goal, further studies should be undertaken at a wider level.

CONCLUSION

This study showed that the prevalence of depression in patients with COPD was high in comparison with general population. In a more detailed study, it was found that smoking, BMI, and FEV₁ were three important risk factors. Effective interventions should be developed to address this clinical concern, and the impact of these interventions should be evaluated by self-reporting measures. One of the suitable strategies for this task is cognitive and behavioral therapy, which requires an examination of all the influential factors that were considered to the extent possible in this study.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Qazvin University of Medical Sciences (decision no: 796, date: 2013.11.23).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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