

# Assessment of the prevalence of depression in chronic obstructive pulmonary disease patients

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**Background** Depression often occurs in patients with chronic obstructive pulmonary disease (COPD). In stable COPD, the prevalence of clinical depression ranges between 10 and 42%. The risk of depression is higher in patients with severe COPD, compared with control participants, reaching up to 62%, in oxygen-dependent patients.

**Aim** The aim of this work was to study the prevalence of depression in COPD patients.

**Patients and methods** The present study was carried out on 100 male COPD patients and 10 female COPD patients admitted to Mansoura Chest Hospital and the chest department of Benha University Hospital during the period from 2014 to 2016. All participants were submitted to Beck's depression Inventory questionnaire.

**Results** The degree of depression assessed by Beck's score increased significantly with the degree of COPD, use of long-term oxygen therapy, and low BMI.

## Introduction

Depression often occurs in patients with chronic obstructive pulmonary disease (COPD) [1]. In stable COPD, the prevalence of clinical depression ranges between 10 and 42%. The risk of depression is higher in patients with severe COPD compared with control participants, with the highest rates, up to 62%, found in oxygen-dependent patients [2]. Patients with COPD may have a spectrum of symptoms ranging in severity from short-term depressive symptoms to dysthymia (long-term chronic symptoms that are not disabling) to clinical depression. A few studies have reported that approximately two-thirds of COPD patients with depression have moderate-to-severe depression. However, the prevalence of minor or subclinical depression may be even higher in this population, assuming that it is similar to other chronic illnesses. Depression is often untreated or undertreated in patients with COPD [3]. Untreated or incompletely treated depression has major implications for compliance with medical treatment, increased frequency of hospital admissions, prolonged length of stay, and increased consultations with primary care physicians; lack of treatment is also associated with poor quality of life and premature death [4].

The aim of this work was to study the prevalence of depression in COPD patients.

**Conclusion** The prevalence and severity of depression increase with increasing severity of COPD.

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## Patients and methods

This study was carried out on 100 male COPD patients and 10 female COPD patients admitted to Mansoura Chest Hospital and Benha University Hospital Chest Department in the period between 2014 and 2016.

Exclusion criteria were as follows:

- (1) By spirometer: improvement of forced expiratory volume in 1st second (FEV1) more than 12% or 200 ml after the use of bronchodilators.
- (2) Obesity: BMI more than 30.
- (3) Primary psychiatric disorder.
- (4) Chronic disabling diseases.
- (5) Malignancies.

All participants were subjected to the following:

- (1) Assessment of history:
  - (a) History of smoking [type of smoking (number)/day (duration)]. Smoking index: mild: less than 200; moderate: 200–400; heavy: more than 400 [5].

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- (b) History of chest symptoms (cough, expectoration, dyspnea, and wheeze).
- (c) History of long-term O<sub>2</sub> therapy.
- (d) History of primary psychiatric disorder.
- (2) Clinical examination:
  - (a) General examination.
  - (b) Local examination.
- (3) BMI was calculated as the weight in kilogram divided by height<sup>2</sup> and classified as follows:
  - (a) Underweight: BMI less than 18.5.
  - (b) Normal: BMI of 18.5–25.
  - (c) Overweight: BMI of 25–30.
  - (d) Obesity: BMI more than 30 [6].
- (4) Plain chest radiograph: posteroanterior.
- (5) Ventilatory function tests: spirometer before and after the use of a bronchodilator (400 mcg of salbutamol) using device Spirolab III (MIR srl, Rome, Italy).
- (6) Beck's depression inventory:
  - (a) Is a 21-question multiple-choice self-report inventory, one of the most widely used instruments for measuring the severity of depression [7].

#### Beck's depression inventory

This depression inventory can be self-scored. The scoring scale is provided at the end of the questionnaire.

- (1) Sadness
  - (a) I do not feel sad: 0.
  - (b) I feel sad: 1.
  - (c) I am sad all the time and I can't snap out of it: 2.
  - (d) I am so sad and unhappy that I can't stand it: 3.
- (2) Pessimism
  - (a) I am not particularly discouraged about the future: 0.
  - (b) I feel discouraged about the future: 1.
  - (c) I feel I have nothing to look forward to: 2.
  - (d) I feel the future is hopeless and that things cannot improve: 3.
- (3) Sense of failure
  - (a) I do not feel like a failure: 0.
  - (b) I feel I have failed more than the average person: 1.
  - (c) As I look back on my life, all I can see is a lot of failures: 2.
  - (d) I feel I am a complete failure as a person: 3.
- (4) Lack of satisfaction
  - (a) I get as much satisfaction out of things as I used to: 0.
  - (b) I don't enjoy things the way I used to: 1.
  - (c) I don't get real satisfaction out of anything anymore: 2.
  - (d) I am dissatisfied or bored with everything: 3.
- (5) Guilty feeling
  - (a) I don't feel particularly guilty: 0.
  - (b) I feel guilty a good part of the time: 1.
  - (c) I feel quite guilty most of the time: 2.
  - (d) I feel guilty all of the time: 3.
- (6) Sense of punishment
  - (a) I don't feel I am being punished: 0.
  - (b) I feel I may be punished: 1.
  - (c) I expect to be punished: 2.
  - (d) I feel I am being punished: 3.
- (7) Self-dislike
  - (a) I don't feel disappointed in myself: 0.
  - (b) I am disappointed in myself: 1.
  - (c) I am disgusted with myself: 2.
  - (d) I hate myself: 3.
- (8) Self-accusations
  - (a) I don't feel I am any worse than anybody else: 0.
  - (b) I am critical of myself for my weaknesses or mistakes: 1.
  - (c) I blame myself all the time for my faults: 2.
  - (d) I blame myself for everything bad that happens: 3.
- (9) Suicidal thoughts
  - (a) I don't have any thoughts of killing myself: 0.
  - (b) I have thoughts of killing myself, but I would not carry them out: 1.
  - (c) I would like to kill myself: 2.
  - (d) I would kill myself if I had the chance: 3.
- (10) Crying
  - (a) I don't cry any more than usual: 0.
  - (b) I cry more now than I used to: 1.
  - (c) I cry all the time now: 2.
  - (d) I used to be able to cry, but now I can't cry even though I want to: 3.
- (11) Irritability
  - (a) I am no more irritated by things than I ever was: 0.
  - (b) I am slightly more irritated now than usual: 1.
  - (c) I am quite annoyed or irritated a good deal of the time: 2.
  - (d) I feel irritated all the time: 3.
- (12) Social withdrawal
  - (a) I have not lost interest in other people: 0.
  - (b) I am less interested in other people than I used to be: 1.
  - (c) I have lost most of my interest in other people: 2.

- (d) I have lost all of my interest in other people: 3.
- (13) Indecisiveness
- (a) I make decisions about as well as I ever could: 0.
- (b) I put off making decisions more than I used to: 1.
- (c) I have greater difficulty in making decisions more than I used to: 2.
- (d) I can't make decisions at all anymore: 3.
- (14) Body image
- (a) I don't feel that I look any worse than I used to: 0.
- (b) I am worried that I am looking old or unattractive: 1.
- (c) I feel there are permanent changes in my appearance that make me look unattractive: 2.
- (d) I believe that I look ugly: 3.
- (15) Work inhibition
- (a) I can work about as well as before: 0.
- (b) It takes an extra effort to get started at doing something: 1.
- (c) I have to push myself very hard to do anything: 2.
- (d) I can't do any work at all: 3.
- (16) Sleep disturbance
- (a) I can sleep as well as usual: 0.
- (b) I don't sleep as well as I used to: 1.
- (c) I wake up 1–2 h earlier than usual and find it hard to get back to sleep: 2.
- (d) I wake up several hours earlier than I used to and cannot get back to sleep: 3.
- (17) Fatigability
- (a) I don't get more tired than usual: 0.
- (b) I get tired more easily than I used to: 1.
- (c) I get tired from doing almost anything: 2.
- (d) I am too tired to do anything: 3.
- (18) Loss of appetite
- (a) My appetite is no worse than usual: 0.
- (b) My appetite is not as good as it used to be: 1.
- (c) My appetite is much worse now: 2.
- (d) I have no appetite at all anymore: 3.
- (19) Weight loss
- (a) I haven't lost much weight, if any, lately: 0.
- (b) I have lost more than five pounds: 1.
- (c) I have lost more than 10 pounds: 2.
- (d) I have lost more than 15 pounds: 3.
- (20) Somatic preoccupation
- (a) I am no more worried about my health than usual: 0. I am worried about physical problems like aches, pains, upset stomach, or constipation: 1.

- (b) I am very worried about physical problems and it's hard to think of much else: 2.
- (c) I am so worried about my physical problems that I cannot think of anything else: 3.
- (21) Loss of libido
- (a) I have not noticed any recent change in my interest in sex: 0
- (b) I am less interested in sex than I used to be: 1
- (c) I have almost no interest in sex: 2
- (d) I have lost interest in sex completely: 3

#### Interpretation of the Beck depression inventory

Now that you have completed the questionnaire, add up the score for each of the 21 questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be 63. This would mean you circled number three on all 21 questions. Since the lowest possible score for each question is 0, the lowest possible score for the test would be 0. This would mean you circled 0 on each question.

You can evaluate your depression according to the Table below.

A persistent score of 17 or above indicates that you may need medical treatment.

#### Interpretation of the Beck Depression Inventory

Total score	Level of depression
1–10	These ups and downs are considered normal
11–16	Mild mood disturbance
17–20	Borderline clinical depression
21–30	Moderate depression
31–40	Severe depression
>40	Extreme depression

A persistent score of 17 or above indicates that you may need medical treatment.

#### Results

The present study was carried out on 100 male COPD patients and 10 female COPD patients admitted to Mansoura Chest Hospital and Benha University Hospital Chest Department. The demographic data of the COPD patients included in this study are shown in (Table 1). The mean age of COPD was  $61.26 \pm 9.42$  years.

On the basis of smoking status, all our 100 male COPD patients were smokers, whereas all the 10 female patients were nonsmokers (Table 1).

**Table 1 Demographic data of the patients studied in terms of age, smoking type, and smoking index**

	N (%)
Age (mean±SD) (years)	61.26±9.42
Sex	
Male	100 (90.9)
Female	10 (9.1)
Smoking	
Nonsmoker	10 (9.1)
Cigarette smoker	78 (70.9)
Nonsmoker	22 (20)
Smoking index	
Mild	20 (20)
Moderate	21 (21)
Severe	59 (59)
Total	100 (100)

However, our nonsmoker COPD female patients were either passive smokers or resident in areas of high pollution such as the manure factory, which are risk factors for development of COPD.

On the basis of the smoking index, COPD patients were classified as mild smokers (20 patients), moderate smokers (21 patients), and heavy smokers (59 patients) (Table 1).

On the basis of the results of post bronchodilator spirometry (according to Global Initiative for Chronic Obstructive Lung Disease (GOLD) [8]), 35 patients were classified as stage II (FEV1: 50–70% predicted), 44 patients were classified as stage III (FEV1: 30–49% predicted), and 31 patients were classified as stage IV (FEV1<30% predicted) (Table 2).

On the basis of the Beck score, COPD patients in the present study were classified according to the degree of depression as those with normal mood (45.5% of patients), mild mood disturbance (19.1% of patients), borderline clinical depression (10.9% of patients), moderate depression (20% of patients), and severe depression (4.5% of patients) (Table 3). Our present study found a highly significant increase in the degree of depression (according to the Beck score), which is in parallel with an increase in the severity of COPD (according to GOLD [8]) (Table 4).

In terms of the relation between long-term O<sub>2</sub> therapy and degree of depression, the results of the present study showed that there was a highly significant increase in the Beck score in COPD patients on long-term O<sub>2</sub> therapy, in comparison with COPD patients, not on long-term O<sub>2</sub> therapy (Table 5).

**Table 2 Classification of chronic obstructive pulmonary disease patients according to Global Initiative for Chronic Obstructive Lung Disease [8]**

Stage of COPD	N (%)
Moderate	35 (31.8)
Severe	44 (40)
Very severe	31 (28.2)

COPD, chronic obstructive pulmonary disease.

**Table 3 Classification of chronic obstructive pulmonary disease patients according to the degree of depression**

Degree of depression	N (%)
Normal	50 (45.5)
Mild mood disturbance	21 (19.9)
Borderline clinical depression	12 (10.9)
Moderate depression	22 (20)
Severe depression	5 (4.5)

In the present study, there was a highly significant relationship between low BMI and Beck score, where the Beck score was higher in underweight patients compared with normal-weight and overweight patients ( $P=0.001$ ) (Table 6).

## Discussion

The present study was carried out on 100 male COPD patients and 10 female COPD patients admitted to Mansoura Chest Hospital and Benha University Hospital Chest Department. The mean age of COPD was 61.26±9.42 years. In this respect, our results highlight the prevalence of COPD in elderly patients, which is in agreement with Menezes *et al.* [9], who recorded a higher prevalence of COPD in late middle age or elderly patients. On the basis of smoking status, all our 100 male COPD patients were smokers, whereas all 10 female patients were nonsmokers. However, our nonsmoker COPD female patients were either passive smokers or resident in areas of high pollution such as the manure factory, which are risk factors for the development of COPD. On the basis of the smoking index, COPD patients were classified as mild smokers (20 patients), moderate smokers (21 patients), and heavy smokers (59 patients). In our present study, we found that all smokers of our COPD patients were men, indicating a higher prevalence of smoking in COPD male patients than in female patients. Our results are in excellent agreement with Kurmi *et al.* [10], who found a higher prevalence of COPD in men, which may be largely related to the higher rate of smoking and occupational exposure to pollution among men. On the basis of the results of post bronchodilator spirometry [according to GOLD [8]], 35 patients



**Table 4 Relation between the degree of depression according to the Beck score and stage of chronic obstructive pulmonary disease according to Global Initiative for Chronic Obstructive Lung Disease [8]**

Degree of depression	Moderate (n=35) [N (%)]	Severe (n=44) [N (%)]	Very severe (n=31) [N (%)]	$\chi^2$	P
Normal	28 (80)	20 (45.5)	2 (6.5)	45.829	<0.001*
Mild mood disturbance	7 (20)	7 (15.9)	7 (22.6)		
Borderline clinical depression	0 (0)	5 (11.4)	7 (22.6)		
Moderate depression	0 (0)	11 (25)	11 (35.5)		
Severe depression	0 (0)	1 (2.3)	4 (12.9)		

\*Highly significant increase in the degree of depression as the severity of chronic obstructive pulmonary disease increases.

**Table 5 Comparison between chronic obstructive pulmonary disease patients on/and not on long term O<sub>2</sub> therapy (LTOT) in terms of the Beck score**

	Long-term O <sub>2</sub> therapy		T	P value
	No (n=101)	Yes (n=9)		
Beck score (mean±SD)	13.52±6.89	27.78±7.17	5.926	<0.001*

\*Highly significant increase in the Beck score in chronic obstructive pulmonary disease (COPD) patients on LTOT in comparison with COPD patients not on LTOT.

**Table 6 Relation between body mass index and the Beck score**

BMI	Beck score (mean±SD)	F	P
Under weight (n=6)	26.50±11.36	7.978	0.001
Normal (n=50)	14.18±7.30		
Overweight (n=54)	13.85±7.14		

Highly significant increase in the Beck score with low BMI.

were classified as stage II (FEV<sub>1</sub>: 50–70% predicted), 44 patients were classified as stage III (FEV<sub>1</sub>: 30–49% predicted), and 31 patients were classified as stage IV (FEV<sub>1</sub> < 30% predicted). On the basis of the Beck score, COPD patients in the present study were classified according to the degree of depression as those with normal mood (45.5% of patients), mild mood disturbance (19.1% of patients), borderline clinical depression (10.9% of patients), moderate depression (20% of patients), and severe depression (4.5% of patients). Our present study found a highly significant increase in the degree of depression (according to Beck score), which is in parallel with an increase in the severity of COPD (according to GOLD [8]).

The present results are in agreement with the study carried out by van Manen *et al.* [11], which showed the prevalence of depression in 25% of severe COPD patients and 19.6% of mild to moderate COPD patients. In this respect, Janssen *et al.* [12] reported the prevalence of depression in 23% of global initiative for obstructive lung disease (GOLD I) and GOLD II, 25.3% of GOLD III, and 34.2% of GOLD IV. It is noteworthy that Ryu *et al.* [13] reported the prevalence of depression in 23% of patients with mild COPD, 54% of patients with moderate COPD, 72% of patients with severe COPD, and 71% of patients with very

severe COPD. Our results could also coincide with those of Lou *et al.* [14], who recorded the prevalence of depression in 15.3% of GOLD I, 25% of GOLD II, 42% of COPD III, and 67% of COPD IV. Our results could be explained by the fact that the decrease in the ventilatory functions and the increase in the degree of COPD are associated with an increase in the risk factors that lead to occurrence of depression such as increase in the severity of dyspnea [15], physical disability, reduced sexual activity, and dependence on others for their personal care [16]. In terms of the relation between long-term O<sub>2</sub> therapy and degree of depression, according to the results of the present study, there was a highly significant increase in the Beck score in COPD patients on long-term O<sub>2</sub> therapy in comparison with COPD patients not on long-term O<sub>2</sub> therapy. Our results were in agreement with the study carried out by Lacasse *et al.* [2], which reported significant depressive symptoms in 57% of COPD patients and severe depressive symptoms in 18% of COPD patients. In this respect, our present results could be attributed to the social stigma associated with oxygen therapy in addition to decreased mobility and decreased social interactions [17]. In the present study, there was a highly significant relationship between low BMI and Beck score, where the Beck score was higher in underweight patients compared with normal-weight and overweight patients ( $P=0.001$ ). These results are in agreement with Daisy *et al.* [12], who found that the clinically relevant symptoms of depression are more common in patients with a low BMI with a  $P$  value less than 0.05. In this respect, our present results could be explained by the fact that COPD is a slowly debilitating disease leading to a decrease in BMI. Furthermore, treatment of dyspnea is less effective in COPD, which leads to long-term use of corticosteroids

and lifestyle changes in these patients, becoming more sedentary, leading to a further decrease in BMI, which is found to be commonly associated with depression in COPD patients.

## Conclusion

The prevalence and severity of depression increase with an increase in the severity of COPD.

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## Conflicts of interest

There are no conflicts of interest.

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