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ENGLISH VERSION: SPECIAL ASPECTS AND CHALLENGES OF DIAGNOSIS OF DEPRESSIVE DISORDERS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Over the past years, increasingly greater attention has been paid to extrapulmonary effects of chronic obstructive pulmonary disease (COPD) that aggravate its progression such as anxiety and depression. No studies of methods of depression detection in COPD patients have been conducted to date. Based on the foregoing and because the Beck Depression Inventory-Short Form (BDI-SF) and the Patient Health Questionnaire-9 (PHQ-9) are some of the most convenient tests, in our study we aimed to assess the informative and diagnostic value of the BDI-SF and PHQ-9 tests in a comparative perspective. The study involved 33 patients with COPD in the stable phase. We used the generally accepted clinical methods, spirometry and mental status assessment by using the PHQ-9 and BDI-SF questionnaires. The results for both surveys of COPD patients were significantly different. Different criteria for assessing severity of symptoms are one of the major differences between the PHQ-9 and BDI-SF questionnaires, which can be a reason for different results for COPD patients. The next important thing for analysis of the results of surveying of COPD patients seems to be the nature of the questions which can be perceived controversially given the course of the underlying disease. Besides, different formulations of essentially similar questions and statements in the surveys can lead to different perceptions and therefore different answers. Interpretation of the survey results for each of the questionnaires is very important. The guidelines for interpretation of the PHQ-9 results are rather complicated as opposed to the guidelines for interpretation of the BDI-SF results, which are simple and only require taking into account the total questionnaire score. These results led us to the conclusion that the use of different surveys for diagnosis of depression in COPD patients can give different results for detection of depression and measurement of its severity. This means that the PHQ-9 and BDI-SF scales can be only used for diagnosis of depression in COPD patients at the screening stage.

Key words: chronic obstructive pulmonary disease (COPD), diagnostic significance, depression, questionnaire survey, interpretation of results

Over the past years, increasingly greater attention has been paid to extrapulmonary effects of chronic obstructive pulmonary disease (COPD) that aggravate and modify its progression. The most common comorbidities observed in COPD patients include skeletal muscle dysfunction, cachexia, lung cancer, pulmonary hypertension, coronary heart disease, osteoporosis, anemia, mental disturbance, etc. [4, 5, 10].

Scientists studying clinical symptoms of COPD are being increasingly focused on the psychological aspects of the disease such as anxiety and depression [5, 11]. These signs significantly worsen both the course and prognosis of the disease [10, 11, 12, 14]. According to different sources, prevalence of depression caused by COPD varies from 10% to 42%, which is a significantly higher level than that in the general population [8, 18,

26]. Despite the high prevalence of COPD-related depression and plenty of evidence suggesting that correction of mental disorders in COPD patients can improve the quality of their life, this concomitant condition often remains undiagnosed or untreated [12, 15, 21]. Besides, COPD-related depression as a mental consequence of the disease and its impact on the quality of life is understudied, at least by pulmonary specialists [1, 12].

Unfortunately, the current COPD patient management instructions offer no detailed screening plan for establishing presence/absence of any concomitant depression or methods of diagnosis and treatment of depression in such patients [11]. Potential approaches to detection of depression in COPD patients have not been investigated yet [25]. On the one hand, various researchers use different methods for detection of depressive disorders in COPD patients, so the results are somewhat different. On the other hand, each researcher generally uses only one method to detect depression.

For instance, depression was detected in 18.8% of cases by using the Zung Self-Rating Depression Scale for patients with stage II COPD [20]. The Beck Depression Inventory (BDI) used for patients with severe and very severe COPD helped diagnose depression in 37% of cases, and in 22% among patients with moderately severe COPD [24]. The Hospital Anxiety and Depression Scale (HADS) allowed diagnosing depression in 28% of COPD patients regardless of the disease stage [8]. The Centre for Epidemiologic Studies Depression Scale (CES-D) used in the exacerbation phase of COPD detected depression in 60% of patients [23]. The CES-D test conducted with COPD patients who were admitted to hospital for pulmonary rehabilitation allowed detecting depression in 48.6% of cases [13]. The HADS test with patients in COPD stages I-II diagnosed depression in 23% of cases, 25.3% among patients with COPD stage III and 34.2% among those with COPD stage IV [15]. The CES-D scale that screened patients with COPD stages II-IV detected depression in 26% of cases [11]. The Patient Health Questionnaire-9 (PHQ-9) used for patients with COPD A, B, D clinical groups diagnosed depression in 28% of cases, of them 5% were categorised as group A, 37% as group B and 58% as group D [1]. The CES-D test that screened patients with COPD regardless of the disease stage diagnosed depression in 21.6% of patients; among severe COPD patients depression was detected in 25% of cases, and in 19.6% of cases among patients with mild to moderate COPD [19]. The HADS test with COPD stages I to IV patients diagnosed depression in 20.8% of cases [7].

Given these differences in the data on depressive disorders in COPD patients and the guidelines of the Global Initiative for Chronic Obstructive Lung Disease (GOLD 2013) for assessment of depression and anxiety in COPD patients, it seems appropriate to examine the relative diagnostic significance of various methods of depression detection that can be used in COPD patients [10, 21, 25].

Based on the foregoing and taking into account that the Beck Depression Inventory-Short Form (BDI-SF)) and PHQ-9 are some of the shortest and most convenient tests, this study was aimed to establish the informative and diagnostic value of the BDI-SF and PHQ-9 in a comparative perspective.

Materials and methods

We have examined 33 COPD patients (30 (90.9%) men and 3 (9.1% women); average age (Med [25-75]) — 66 [62-68] years, forced expiratory volume in 1 second (FEV1) (Med [25-75]) — 56.2 [45.7-62.2]% of the predicted value). All patients were in a stable phase of COPD and received basic therapy according to their clinical groups pursuant to Order No.555 of the Ministry of Health of Ukraine dated June 6, 2013 [2].

A clinical diagnosis of COPD was formulated in accordance with Order No.555 of the Ministry of Health of Ukraine dated June 27, 2013 [2].

All patients signed informed consent forms for participation in the study.

The screening tests included the generally accepted clinical methods, computer-assisted spirometry with MasterScreen Body/Diff system (E. Jaeger, Germany).

The mental status examination was performed with PHQ-9 [16, 17, 22] and BDI-SF [6] tests, an acceptable substitute for the full version of BDI [24] that can be used for detection of depression [9]; the short version is also more simple and easy to use by therapists or pulmonary specialists.

For statistical analysis of the results we used biometric analysis methodology supported by STATISTICA 6.0 software. Significance of differences was assessed with the Pearson's chi-squared test.

Results and discussion

According to the PHQ-9 test, depression was found in 8 patients (24.2 ± 7.5%), while the BDI-SF test detected 12 patients with the disorder (36.6 ± 8.4%) (p=0.3). Both tests helped diagnose depression in 7 patients: 1 with the PHQ-9 test and 5 patients with the BDI-SF scale.

Significant differences were found when assessing the severity of depression by using both tests. While according to the PHQ-9 mild depression was present in 2 patients (25%), moderate depression in 4 patients (50%) and moderately severe depression in 2 (25%) of cases, the BDI-SF detected mild to moderate depression in 6 patients (i.e. 50%), and none of the patients had severe depression.

Since the results of the two tests were significantly different, we thought it was appropriate to carefully analyse the structure of each questionnaire, patients' answers to each of the questions and calculate the scores taking into account special clinical aspects of COPD patients.

Criteria for assessing the severity of symptoms are one of the major differences between the PHQ-9 and BDI-SF questionnaires. While the PHQ-9 is based on the principle of symptom duration (Fig. 1),

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

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Fig. 1. The PHQ-9 questionnaire [3, 22].

the BDI-SF test is aimed to measure the severity of symptoms by their intensity (Table 1). This difference can be one of the reasons for the different results of the above tests of COPD patients.

For the PHQ-9 scale, 4.7 ± 1.2% of positive answers to the questions totalled to maximum score, a value indicating maximum duration of a symptom. However, measurement of the severity of symptoms by using the BDI-SF questionnaire showed that the results denoting maximum severity of symptoms could be only found in a few answers (0.9 ± 0.5%). We believe that this should be taken into account in diagnosis of depression and assessing the severity of depression in COPD patients because COPD symptoms are constant and can have long-term effects on the mental state of patients.

Table 1
BDI-SF Scale

Statement No.	Statement	Points
1.	I do not feel sad.	0
	I feel sad (depressed).	1
	I feel constantly sad and depressed and feel unable to snap out of it.	2
	I feel so sad or unhappy that I cannot stand it.	3
2.	I have lost all of my interest in other people.	0
	I am less interested in other people than before.	1
	I have lost most of my interest in other people and have little feeling for them.	2
	I have lost all my interest in other people and I don't care about them at all.	3
3.	I'm not particularly discouraged about the future.	0
	I feel discouraged about the future.	1
	I feel I have nothing to look forward to.	2
	I feel that the future is hopeless and that things cannot improve.	3
4.	I make decisions about as well as ever.	0
	I try to put off making decisions.	1
	I have great difficulty in making decisions.	2
	I cannot make any decisions at all anymore.	3
5.	I do not feel like a failure.	0
	I feel I have failed more than the average person.	1
	As I look back on my life, all I can see is a lot of failures.	2
	I feel I am a complete failure (as a father, husband, wife, etc.)	3
6.	I don't feel that I look any worse than I used to.	0
	I am worried that I am looking old or unattractive.	1
	I feel there are permanent changes in my appearance that make me look unattractive.	2
	I believe that I am ugly or repulsive looking.	3
7.	I am not particularly dissatisfied.	0
	I feel bored most of the time.	1
	I don't enjoy things the way I used to.	2
	I'm dissatisfied with everything.	3
8.	I can work about as well as before.	0
	It takes an extra effort to get started at doing something.	1
	I have to push myself very hard to do anything.	2
	I can't do any work at all.	3
9.	I don't feel particularly guilty.	0
	I feel guilty or unworthy a good part of the time.	1
	I feel quite guilty.	2
	I feel as though I am very bad or worthless.	3
10.	I don't get more tired than usual.	0
	I get tired more easily than I used to.	1
	I get tired from doing anything.	2
	I am too tired to do anything.	3
11.	I don't feel disappointed in myself.	0
	I am disappointed in myself.	1
	I am disgusted with myself.	2
	I hate myself.	3
12.	My appetite is no worse than usual.	0
	My appetite is not as good as it used to be.	1
	My appetite is much worse now.	2
	I have no appetite at all anymore.	3
13.	I have thoughts of harming myself.	0
	I feel I would be better off dead.	1
	I have definite plans about committing suicide.	2
	I would kill myself if I could.	3

The next important thing for analysis of the results of surveying of COPD patients seems to be the nature of the questions which can be perceived controversially given the course of the underlying disease. We faced some challenges when assessing the results of the PHQ-9 and BDI-SF testing, so we decided to carefully analyse the answers of each patient.

When completing the PHQ-9 questionnaire (Fig. 1) patients were asked to answer nine questions by choosing points depending on the duration of their symptoms — from 0 (the problem did not cause any trouble to the patient) to 3 (the problem caused trouble to the patient almost every day) (Table 2).

Table 2
Results of Analysis of Patients' Answers to the PHQ-9 Statements

Statement No.	Short Identifier	Number of patients who answered affirmatively, n (% ± m)
1.	Patient's interest in their activities	11 (33.3 ± 8.2)
2.	Sense of depression and hopelessness	12 (36.4 ± 8.4)
3.	Insomnia	19 (57.7 ± 8.6)
4.	Fatigability	28 (84.6 ± 6.2)
5.	Loss of appetite	6 (18.2 ± 6.7)
6.	Self-dislike	8 (24.3 ± 7.5)
7.	Loss of concentration	6 (18.2 ± 6.7)
8.	Slower movements and speech	11 (33.3 ± 8.2)
9.	Death wish	4 (12.1 ± 5.7)

Most affirmative answers (from 1 to 3 points) were given to two statements: the fourth (fatigability) and the third (insomnia) ones. The smallest number of affirmative answers were given to the fifth (loss of appetite), seventh (loss of concentration) and ninth (death wish) statements.

We made a similar analysis of patients' answers by the results of the BDI-SF survey (Table 1). The questionnaire contains 13 groups of statements. Each patient was asked to choose one statement that best describes their then current condition. Each statement in the group was scored from 0 (no symptom) to 3 (a most pronounced symptom) (Table 3).

Table 3
Results of Analysis of Patients' Answers to the BDI-SF Scale

Statement No.	Short Identifier	Number of patients who answered affirmatively, n (% ± m)
1.	Sense of sadness	5 (15.2 ± 6.3)
2.	Interest in others people	7 (21.2 ± 7.1)
3.	Pessimism	10 (30.3 ± 8.0)
4.	Indecisiveness	10 (30.3 ± 8.0)
5.	Sense of failure	3 (9.1 ± 5.0)
6.	Body image change	8 (24.3 ± 7.5)
7.	Dissatisfaction	7 (21.2 ± 7.1)
8.	Work difficulty	23 (69.7 ± 8.0)
9.	Sense of guilt	3 (9.1 ± 5.0)
10.	Fatigability	31 (93.9 ± 4.2)
11.	Self-dislike	2 (6.1 ± 4.2)
12.	Loss of appetite	11 (33.3 ± 8.2)
13.	Death wish	0

Most patients chose points from 1 to 3 in two groups of statements: the tenth (fatigability) and the eighth (work difficulty). Fewest affirmative answers were given in the fifth (sense of failure), ninth (sense of guilt) and eleventh (self-dislike) groups of statements. In the thirteenth group of statements none of the patients chose the death wish option.

A detailed study of each COPD patient's choices in the surveys showed that some symptoms developed very often while others were rare or absent at all. For example, in both tests the most common choices were those of the fatigability statements; in the PHQ-9 only the most common choice was about loss of sleep; in the BDI-SF only it was the one about work difficulty. The latter can be explained by the fact that the underlying disease (COPD) or elderly age of patients (COPD is generally developed in elderly patients) can cause the above symptoms and therefore they are not always resulted from mental disorders.

It should be also noted that different formulations of essentially similar questions and statements in the surveys can lead to different perceptions and therefore different answers. For instance, similar statements about death wish in the PHQ-9 and BDI-SF look somewhat different, which obviously gives different numbers of affirmative answers and should be taken into account while detecting depression in COPD patients to prevent false positive or false negative results.

Interpretation of the survey results for each of the questionnaires is of particular importance. The guidelines for interpretation of the PHQ-9 results [14, 16, 17, 22] are rather complicated. They require calculating both the points for each statement and the total score; special attention is paid to choices for statements 1 and 2. These aspects are used to divide the results (in accordance with the guidelines) into three groups: "depressive disorder", "major depressive disorder" and "other depressive disorder". The degree of severity of depression is measured by calculating the total score.

According to our data, 8 patients, who were diagnosed with depression after they have completed the PHQ-9 survey, actually had various types of depressive disorders, where major depressive disorders were the least common (Table 4).

Table 4
Results of Diagnosis of Depression in COPD Patients by Using the PHQ-9 Scale

Criteria of patient diagnose based upon interpretation of the PHQ-9 results	PHQ-9 data conclusion	Number of patients, n (% ± m)	Result in points (severity of depression according to the PHQ-9)
At least 5 answers in the shaded sections of the questionnaire, one of which was to statement 1 or statement 2	Major depressive disorder	1 (12.5 ± 11.7)	16 (moderately severe depression)
At least 4 answers in the shaded sections of the questionnaire, including to statements 1 and 2	Depressive disorder	4 (50.0 ± 17.7)	19 (moderately severe depression) 14 (mild depression) 12 (mild depression) 11 (mild depression)
From 2 to 4 answers in the shaded sections of the questionnaire, one of which was to statement 1 or statement 2	Other depressive disorder	3 (37.5 ± 17.1)	10 (mild depression) 7 (mild depression) 5 (mild depression)

On the other hand, guidelines for interpretation of the BDI-SF results [6, 9] are simple and only require taking into account the total questionnaire score that determines the presence of depression and its severity (see Table 1).

For example, according to the BDI-SF interpretation criteria, where the score is from 0 to 4 points, depression is not diagnosed at all or there is the lowest degree of severity (our data showed that this state was absent); 5 to 7 points correspond to mild depression (our data suggested that this state was present in 6 patients, mean score was 5.8 ± 0.4); 8 to 15 points correspond to moderately severe depression (according to our data, this state was detected in 6 patients, mean score was 9.5 ± 0.8); 16 or more points correspond to severe depression (we have not detected any cases) [6].

Obviously, interpretations of the results by using both the PHQ-9 and BDI-SF tests differ from each other considerably by methodology. Analysis of the PHQ-9 results is also more complicated and time-consuming while analysis of the BDI-SF results is much easier to perform by a simple calculation of the score. Neither of the surveys takes into account COPD as an underlying disease which means that the tests can only be used at the screening stage for signs of depression and detecting persons who need further consultative examination by a psychiatrist.

Conclusions

1. The use of different surveys for diagnosis of depression in COPD patients can give different results for detection of depression and measurement of its severity.
2. One of the reasons for different patient results is different methodological approaches used in the development of the PHQ-9 and BDI-SF tests. It is better to use the BDI-SF scale for detection of depression in COPD patients because the test measures each symptom by its intensity rather than duration.
3. Particularly frequent confirmation of certain symptoms of depression in COPD patients who complete both questionnaires can indicate ambiguous nature of these symptoms. They can be caused by COPD and/or elderly age of patients rather than their mental disorders.
4. Methodologies of interpretation of the PHQ-9 and BDI-SF patient results are very different by their complexity. We believe that analysis of the BDI-SF results is more simple and easy to use, which is especially important during the baseline examination of patients and detection of depression in COPD patients by a family doctor, GP or pulmonary specialist.
5. The PHQ-9 and BDI-SF scales can be only used for diagnosis of depression in COPD patients as a screening step to find the patients who need further examination by a psychiatrist.

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