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The Assessment of Prevalence of Depression and its Severity by Using PHQ-9 Tool in Patients of Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: COPD is an umbrella term for various clinical entities with multiple causes resulting in airflow limitation that is not fully reversible. Anxiety and depression contribute to a substantial burden of COPD-related morbidity, notably by impairing quality of life and reducing adherence to treatment. In this study, we investigated the prevalence of depression and its severity by using PHQ-9 tool in patients of COPD. **Methods:** The present study was carried out on 42 male COPD patients and 8 female COPD patients. COPD severity was classified according to Global Initiative for Chronic Obstructive Lung Disease (GOLD 2019) guidelines. Depression was evaluated with the validated Hindi version of nine items of PHQ-9 (a subset of Patient Health Questionnaire). **Result:** The mean age of COPD patients was 56.64±8.98 years. 13 patients were classified as moderate COPD (FEV1: 50–80% predicted), 29 patients were classified as severe COPD (FEV1: 30–49% predicted), and 8 patients were classified as very severe COPD (FEV1<30% predicted). On the basis of the PHQ-9 score, COPD patients in the present study were classified according to the degree of depression as those with normal mood (26% of patients), mild depression(18% of patients), moderate depression (32% of patients), moderately severe depression (20% of patients), and severe depression (4% of patients). The cumulative prevalence of depression in the present study was 74%. **Conclusion:** There is a high prevalence of depression in the Indian COPD patients. The prevalence and severity of depression increase with an increase in the severity of COPD.

Keywords: COPD, PHQ-9, GOLD, Depression.

INTRODUCTION

COPD is an umbrella term for various clinical entities with multiple causes resulting in airflow limitation that is not fully reversible.[1-4] Hence, COPD is better defined as a clinical syndrome characterized by chronic respiratory symptoms, structural pulmonary abnormalities (airways disease, emphysema, or both), lung function impairment (primarily airflow limitation that is poorly reversible), or any combination of these.[5] Patients with COPD are at a higher risk than patients without COPD for the development of coexisting conditions that are associated with poor outcomes, including death.[6,7]

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death worldwide; COPD led to 3.2 million deaths in 2017, a toll expected to reach 4.4 million yearly by 2040.[8,9] With a worldwide prevalence of 10.1%, COPD afflicts many people in low-income, middle-income, and wealthy countries, and years of life lost prematurely increased 13.2% between 2007 and 2017.[8] Although COPD has traditionally been considered a disease that affects men, in some countries, the prevalence and associated mortality are higher among women than among men.

Extra pulmonary manifestations in COPD, in addition to pulmonary component, are common. It has been observed in the ECLIPSE study that co morbidities were significantly higher in patients with COPD than in smokers and never smokers.[10] The important co morbidities associated with COPD are cardiovascular disorders (coronary artery disease and chronic heart failure, hypertension), metabolic diseases (diabetes mellitus, metabolic syndrome and obesity), bone disease (osteoporosis and osteopenia), stroke, lung cancer, cachexia, skeletal muscle weakness, anemia, depression and cognitive decline.[11,12]

During the past two decades, there has been increasing recognition that patients with chronic obstructive pulmonary disease (COPD) with three or more comorbidities are more likely to be frequently

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hospitalized and may die prematurely compared with COPD patients without comorbidities.[13] Of such comorbidities, anxiety and depression contribute to a substantial burden of COPD-related morbidity, notably by impairing quality of life and reducing adherence to treatment.[14] Untreated and under-recognised depression and anxiety symptoms in patients with COPD have deleterious effects on physical functioning and on social interaction, increasing fatigue and healthcare utilisation.[15,16] Depression and anxiety are challenging to identify and treat because their symptoms often overlap with those of COPD.[17] Identifying depression and anxiety, and developing appropriate treatment strategies are critical to improving the quality of life of COPD patients and reducing their healthcare utilisation. In our study we have used PHQ-9 (Patient Health Questionnaire) to find out the depression in COPD patients. This scale was in English version so it was translated in Hindi version and then it was used for the COPD patients. The Patient Health Questionnaire (PHQ) is a multiple-choice self-report inventory copyrighted by Pfizer Inc, that is used as a screening and diagnostic tool for mental health disorders of depression, anxiety and somatoform.[18]

MATERIALS AND METHODS

Study design

This cross sectional study was carried out in the Department of Pulmonary Medicine, TMMC & RC, TMU Hospital, Moradabad, Uttar Pradesh. All COPD patients who met the inclusion criteria and willing to participate in this study were selected.

Inclusion criteria

- Diagnosed cases of COPD.
- Patients willing to participate in the study by giving a written consent.

Exclusion criteria

- Acute exacerbation of COPD.
- Recent myocardial infarction < 4months.
- Primary psychiatric disorder.
- Chronic disabling diseases.
- Malignancies.

The spirometric measurements (FVC, FEV1 and FEV1/FVC) and bronchodilator responses were performed in sitting position as per the American Thoracic Society guidelines.19 Depending on the postbronchodilator FEV1 (%) values, the patients were classified in four stages of COPD as per Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommendations20: Stage I (>80), Stage II (50-79), Stage III (30-49) and Stage IV (<30).

Measurement of depression

Depression was evaluated with the validated Hindi version18 of nine items of PHQ-9 (a subset of Patient Health Questionnaire). PHQ-9 is a self-report version of Primary care Evaluation of Mental Disorders (PRIME-MD).[21] PHQ-9 consists of nine criteria on which the diagnosis of DSM-IV depressive disorders is based.22 The PHQ-9 is a dual-purpose instrument that, with the same nine items, can establish provisional depressive disorder diagnosis as well as grade depressive symptom severity. Each of the nine items of PHQ-9 was scored from 0 (not at all) to 3 (nearly every day). Total score ranged from 0 to 27 and depending upon the total score, severity of depression was classified as follows: none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19) and severe (20-27).

Statistical analysis

The statistical analysis was done using Statistical Package for the Social Sciences (SPSS)-version 9.0, and a p-value of <0.05 was considered significant. Data are presented as mean± standard deviation (SD). For comparison of mean, we have used one-way analysis of variance (ANOVA) and categorical data was compared by Chi-square test.

RESULTS

The present study was carried out on 42 male COPD patients and 8 female COPD patients. The demographic data of the COPD patients included in this study are shown in [Table 1-3] and their mean age was 56.64±8.98 years. On the basis of smoking status, all our 42 male COPD patients were smokers, whereas all the 8 female patients were nonsmokers [Table 3]. However, the nonsmoker COPD female patients were either passive smokers or were exposed to high pollution such as the burning of biomass fuel, outdoor air pollution and occupational exposures which are risk factors for the development of COPD.

Table 1: Demographic data of the Chronic Obstructive Pulmonary Disease patients studied in terms of age.

Age (Years)	Frequency	Percent
40-50	14	28.0
50-60	22	44.0
60-70	14	28.0
Total	50	100.0
Mean±SD	56.64±8.98	

Table 2: Demographic data of the Chronic Obstructive Pulmonary Disease patients studied in terms of gender.

Gender	Frequency	Percent
Female	8	16.0
Male	42	84.0
Total	50	100.0

Table 3: Demographic data of the Chronic Obstructive Pulmonary Disease patients studied in terms of smoking habit.

Smoking Habit	Frequency	Percent
Absent	8	16.0
Present	42	84.0
Total	50	100.0

Table 4: Classification of Chronic Obstructive Pulmonary Disease patients according to Global Initiative for Chronic Obstructive Lung Disease.

COPD Severity	Frequency	Percent
Moderate	13	26.0
Severe	29	58.0
Very severe	8	16.0
Total	50	100.0

Table 5: Classification of Chronic Obstructive Pulmonary Disease patients according to the degree of depression.

Depression Severity	Frequency	Percent
None	13	26.0
Mild	9	18.0
Moderate	16	32.0
Moderately severe	10	20.0
Severe	2	4.0
Total	50	100.0

Table 6: Spirometric values and PHQ-9 score in the different age groups of Chronic Obstructive Pulmonary Disease patients.

Parameters	Age (Years)	N	Mean	Std. Deviation
FEV1%	40-50	14	42.2143	17.64687
	50-60	22	40.0909	13.61340
	60-70	14	40.2857	12.76671
	Total	50	40.7400	14.35812
FVC%	40-50	14	61.7857	20.67767
	50-60	22	58.7273	13.20239
	60-70	14	53.3571	13.69788
	Total	50	58.0800	15.76076
PHQ-9 score	40-50	14	10.3571	7.34436
	50-60	22	10.5909	4.93442
	60-70	14	10.5000	5.41721
	Total	50	10.5000	5.70446

Test applied: One-way ANOVA.

Table 7: Relation between the degree of depression according to the PHQ-9 score and stage of chronic Obstructive Pulmonary Disease according to Global Initiative for Chronic Obstructive Lung Disease.

Depression Severity	COPD Severity			Total
	Moderate	Severe	Very Severe	
Mild	3	6	0	9
	33.3%	66.7%	.0%	100.0%
Moderate	0	15	1	16
	.0%	93.8%	6.3%	100.0%
Moderately severe	0	5	5	10
	.0%	50.0%	50.0%	100.0%
Severe	0	0	2	2
	.0%	.0%	100.0%	100.0%
None	10	3	0	13
	76.9%	23.1%	.0%	100.0%
Total	13	29	8	50
	26.0%	58.0%	16.0%	100.0%
p-value	0.001 (Sig.)			

Test applied: Chi-square test. Sig.-Significant ($p \leq 0.05$)

Table 8: Corelation of PHQ-9 score with FEV1% and FVC%

PHQ-9 Score	FEV_1%	FVC%
Pearson Correlation	-0.848**	-0.748**
Sig. (2-tailed)	0.000	0.000
N	50	50
**. Correlation is significant at the 0.01 level (2-tailed).		

On the basis of the results of post bronchodilator spirometry (according to Global Initiative for Chronic Obstructive Lung Disease (GOLD 2019),[20] 13 patients were classified as moderate COPD (FEV1: 50–80% predicted), 29 patients were classified as severe COPD (FEV1: 30–49% predicted), and 8 patients were classified as very severe COPD (FEV1<30% predicted) [Table 4]. On the basis of the PHQ-9 score, COPD patients in the present study were classified according to the degree of depression as those with normal mood (26% of patients), mild depression(18% of patients), moderate depression (32% of patients), moderately severe depression (20% of patients), and severe depression (4% of patients) [Table 5].

The spirometric values and PHQ-9 score in the different age groups of the COPD patients are summarised in the [Table 6]. The mean FEV1 and FVC value for the entire study population was 40.74±14.35 and 58.08±15.76 respectively. The mean PHQ-9 score for the entire study population was 10.50±5.70. [Table 7] shows the PHQ-9 scoring severity in different stages of COPD. The mean PHQ-9 scores increased significantly with increasing severity of COPD (p=0.001). Our present study found a significant increase in the degree of depression (according to the PHQ-9 score), which is in parallel with an increase in the severity of COPD (according to GOLD 2019).20 The cumulative prevalence of depression in the present study was 74% and prevalence of depression increases with the severity of COPD (p=0.001).

DISCUSSION

The present study was carried out on 42 male COPD patients and 8 female COPD patients attending to Department of Pulmonary Medicine, TMMC & RC, TMU Hospital, Moradabad, Uttar Pradesh. The mean age of COPD patients was 56.64±8.98 years. In the current study, we investigated the prevalence of undiagnosed depression in different stages of COPD patients. The prevalence of depression in the present study is 74 percent. The raised mean PHQ-9 (10.50±5.70) scoring in all stages of COPD indicates that most of the subjects are suffering from subclinical or undiagnosed depression. In a review of three studies, Solano et al,[23] observed the prevalence of depression in COPD patients ranged from 37% to 71% and the cumulative prevalence of depression in our present study is comparable with their results.

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,[24] 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. Our

present study found a highly significant increase in the degree of depression (according to PHQ-9 score), which is in parallel with an increase in the severity of COPD (according to GOLD).[20]

COPD is a leading cause of morbidity and the prevalence of COPD is on a rising trend. Comorbidities like psychiatric and physical illness presents a unique health-care challenge for the pulmonologist. The presence of unrecognised subclinical depression in patients with COPD is a major concern, as they are at the risk of developing major depression and may increase the burden of physical disability.[25] Severe breathlessness, progressive irreversible condition and associated hypoxia might be responsible for the organic causes of depression in severe COPD. In addition, advanced age, low socio-economic condition and the chronic nature of the disease may result in social isolation and leads to more depressive feelings.[26] Even after adjusting the severity of COPD, depression is responsible for fatigue, shortness of breath and disability.[27]

Depression can be diagnosed by using several screening tests that are available in primary care set ups. The PRIME-MD is highly sensitive and has a reasonably good positive predictive value for screening for anxiety and depression, and this test is useful and an easily administered tool for primary care physicians.[28] The PHQ-9 diagnostic validity and symptom severity with clinician-detected severity have a good correlation.[29] The relatively high prevalence of depression in our study population is possibly due to poverty, poor education and high prevalence of common mental disorders in general Indian population.[30] Screening questionnaires for psychological impairment in COPD may be less precise since they include many somatic symptoms which occur as part of the disease or ageing process.[31]

Manen et al,[32] observed that the patients with mild to moderate COPD severity are not at increased risk for depression but patient with severe COPD had 2.5 times (95% CI, 1.2 to 5.4) higher risk of depression. Our present study is in line with this and it shows that the prevalence of depression increases with the severity of COPD. Pulmonary rehabilitation, cognitive behavioural therapy and pharmacotherapy are useful in treatment of depression in patients with COPD.33 Smoking associated depression is highest among people who try to quit, followed by those who consider quitting and lowest among those who left smoking for more than one year.[34] The association of smoking and depression is due to nicotine dependency rather than smoking index.[35]

There are few limitations of the present study which needs to be mentioned. All the subjects were selected from a single centre and of which 84 percent were males. So our single centre study may not represent population from any geographical area. Other than tobacco smoking, indoor and outdoor pollution, exposure to dust and fume and low socio-economic status plays an important role in pathogenesis of COPD especially in the female subjects from developing countries.[36] In the present study population, 8 female patients with fixed airway obstruction had the history of exposure to other risk factors, but none were current or ex-smoker.

CONCLUSION

There is a high prevalence of depression in the Indian COPD patients. The prevalence and severity of depression increase with an increase in the severity of COPD. Dyspnea is a common symptom in COPD and this chronic dyspnea is a strong factor for the comorbidities like depression in a COPD patient. Depressive symptoms are common in all stages of COPD and the prevalence of depression in Indian patients with COPD is high. Therefore, there is a need for screening of COPD patients for depression and those with higher depression score should undergo further evaluation. Further studies are needed with large sample size from various centres for the assessment of the prevalence of depression in Indian patients with COPD.

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