Original Article

Prevalence of Depression in Stable Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background. Psychological impairment is a significant co-morbid condition of chronic obstructive pulmonary disease (COPD). No studies from India have been conducted to assess the prevalence of depression in COPD.

Methods. We investigated the prevalence of depression in 100 consecutive stable COPD patients during their routine out-patient department visits. Patients diagnosed to have depression or chronic systemic diseases were excluded. Severity of the COPD was classified according to Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines. Hindi translations of patient health questionnaire-9 (PHQ-9) were administered and severity of depression was assessed at each stage of the COPD.

Results. All subjects were males with a mean age of 61.7±9.6 years. Six patients in stage I, 32 patients in stage II, 40 patients in stage III and 22 patients in stage IV of the COPD were enrolled. The cumulative prevalence of depression in the study population was 72 percent.

Conclusions. Symptoms of depression were observed at all stages of COPD and its severity increased with an increase in severity of the COPD. High prevalence of depressive symptoms in Indian patients with COPD may be due to various confounding factors. Screening for symptoms of depression in patients with COPD by simple and quick validated questionnaires during their out-patient visits will be helpful in early diagnosis and appropriate treatment or referral.
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Key words: Depression, PHQ-9, Chronic obstructive pulmonary disease.

INTRODUCTION

Depression is a significant co-morbid condition of chronic obstructive pulmonary disease (COPD). The prevalence of depression in stable COPD ranges between 10 percent and 42 percent.[1-4] The estimates are variable either due to the use of different tools of measurement or variations in the degree of severity of illness across the studies.

Depression in COPD is associated with poor compliance to treatment, frequent hospitalisation or doctor visit, prolonged hospital stay, poor quality of life and high cost of treatment.[5] The impact of depression in the management of COPD is receiving interest and the American College of Chest Physicians organised a multi-disciplinary workshop to shed the light on the current understanding and to identify the areas of future research needs.[4]

Detection of depression in patients with COPD by a simple questionnaire will help respiratory physicians to diagnose it and appropriate treatment or referral. Patient health questionnaire-9 (PHQ-9) is a part of the primary care evaluation of mental disorders (PRIME-MD) and utilises a semi-structured psychiatric interview using the *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition) (DSM-IV) criteria to assess the severity and functional impairment due to depression.[6] The PHQ-9 is a standardised, brief and easy screening instrument designed to diagnose depression in primary care settings for the busy clinician. In PHQ-9, patients indicate for each of the nine depressive symptoms during the previous two weeks. Hindi (local Indian language) translation of PHQ-9 is well validated by Kochhar *et al*[7] for the diagnosis of depression as per DSM-IV.

The present study was conducted to assess the prevalence and severity of depression using the Hindi translation of PHQ-9 in different stages of chronic stable COPD.

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MATERIAL AND METHODS

This cross-sectional study was carried out on consecutive patients with COPD during their routine out-patient visits in Bhopal Momorial Hospital and Research Centre, Bhopal from July 2008 to April 2009. The subjects were recruited on the basis of a written informed consent. The study was approved by the Institutional Ethics Committee.

Those patients who meet the following criteria were included in this study: (1) age more than 40 years, (2) ex-smoker or current smoker with a smoking history of more than 10 pack years (Ex-smoker was defined as a person who stopped smoking for more than one year); and (3) ratio of forced expiratory volume in one second (FEV_1) and forced vital capacity (FVC) less than 0.70 and FEV_1 or FVC fails to increase absolute volume greater than and equal to 200mL and 12% after 200µg of salbutamol inhalation.

Patients with prior diagnosis of depression or subjects with other chronic systemic illness, like malignancy, diabetes mellitus, coronary artery disease, renal or hepatic disease were excluded from the study.

The spirometric measurements (FVC, FEV_1 and FEV_1/FVC) and bronchodilator responses were performed in sitting position as per the American Thoracic Society guidelines.[8] Depending on the post-bronchodilator FEV_1 (%) values, the patients were classified in four stages of COPD as per Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommendations[9]: Stage I (>80), Stage II (50-79), Stage III (30-49) and Stage IV (<30).

Hindi translation of PHQ-9 was self administered to literate patients. For illiterate patients, help was sought from either relative or paramedical workers to read out the questionnaire and to record the responses. Each of the nine items of PHQ-9 was scored from 0 (not at all) to 3 (nearly every day). Total score can range from 0 to 27. Depending upon total score, the severity of depression was classified as follows: none (0-4), mild (5-9), moderate (10-14), moderately severe (15-19) and severe (20-27). Major depression was diagnosed if five or more of the depressive nine symptom criteria were present for at least "more than half the days" in the past two weeks, and one of the symptoms was depressed mood or anhedonia. Other depression was diagnosed if 2, 3, or 4 depressive symptoms were present for at least "more than half the days" in the past two weeks, and one of the symptoms was depressed mood or anhedonia.

Statistical Analysis

The statistical analysis was done using Statistical Package for the Social Sciences (SPSS)-version 9.0, (USA) 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

One hundred stable subjects with COPD were studied. All subjects were men and their mean age was 61.7±9.6 years. The demographic characteristics of the patients and spirometric values are summarised in the table. The average FEV_1 of the study population was 1.22±0.52 liters.

Table. Demographics, spirometry data and PHQ-9 score of the study population

Characteristics	Stage I	Stage II	Stage III	Stage IV
No. of subjects	6	32	40	22
Age (years)	63.0±10.4	64.8±8.9	61.4±10.6	57.5±7.2
FVC (L)	3.69±0.88	2.98±0.63	2.39±0.51	2.01±0.43
FEV_1 (L)	2.22±0.37	1.59±0.40	1.06±0.25	0.68±0.17
Mean PHQ-9 Score	12.7±3.6	13.0±5.4	15.5±3.6	16.8±4.6*

*p<0.009; FVC=Forced vital capacity; FEV_1=Forced expiratory volume in one second; PHQ-9=Patient health questionnaire-9

The mean PHQ-9 score for the entire study population was 14.8±4.7. Seventeen out of the 100 patients (17%) had PHQ-9 scores of 20 or more, suggestive of severe depression. Figure 1 shows the PHQ-9 scoring severity in different stages of COPD. The mean PHQ-9 scores increased significantly with increasing severity of COPD (p=0.009). The prevalence of major depression and other depression in stages I, II, III and IV were 83.3%, 56.3%, 72.5% and 86.4%, respectively (Figure 2).

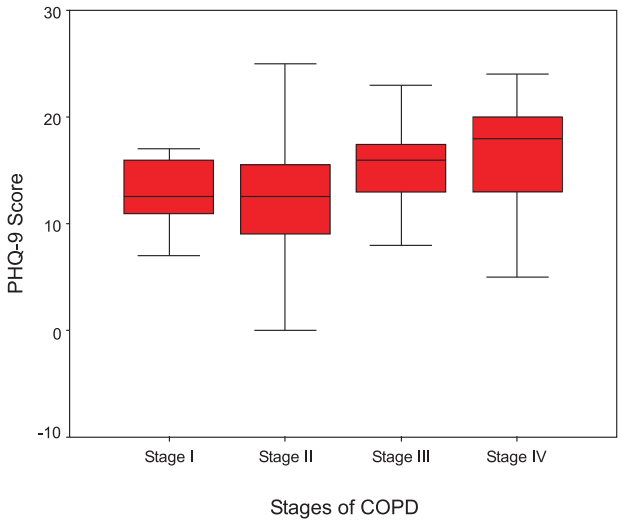

Figure. 1. PHQ-9 scoring severity in different stages of COPD.

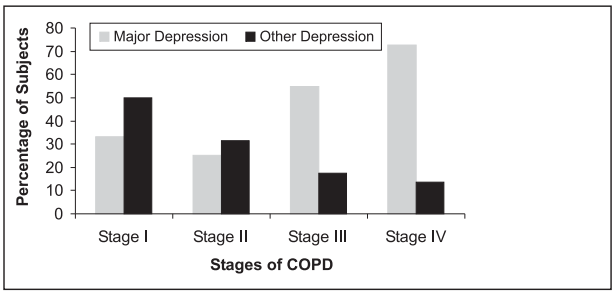

Figure 2. Prevalence of depressions in different COPD stages.

The cumulative prevalence of depression (both major depression and other depression) in the present study was 72% and prevalence of depression increases with the severity of COPD (p=0.024).

DISCUSSION

In the present study, we investigated the prevalence of undiagnosed depression in different stages of COPD patients. *To the best of our knowledge, this is the first study to evaluate the prevalence of depression in patients with COPD from India.* The prevalence of depression in the present study is 72 percent. The raised mean PHQ-9 (14.66±4.5) scoring in all stages of COPD indicates that most of the subjects are suffering from subclinical depression irrespective of COPD severity. In a review of three studies, Solano *et al*[10] had observed the prevalence of depression ranged from 37% to 71% of COPD patients and the cumulative prevalence rate of depression in our study is comparable with their results.

Chronic obstructive pulmonary disease is a leading cause of morbidity and the prevalence of COPD is rising. Co-morbid psychiatric and physical illness presents a unique health-care challenge for the respiratory physician. The risk of developing depression in COPD is high compared to healthy individuals. The presence of unrecognised sub-clinical 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.[1] Several factors are attributed for developing depression in patients with COPD. Severe dyspnoea, progressive irreversible condition and associated hypoxia may responsible for 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.[2] Even after adjusting the severity of COPD, depression is responsible for fatigue, shortness of breath and disability.[4]

Several screening tests are available to diagnose depression in primary care settings. Overall sensitivity and specificity of these tests to detect depression are 84% (95% confidence interval [CI], 79% to 89%) and 72% (95% CI, 67% to 77%), respectively and, there are no significant differences between the screening tests.[11] 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.[12] The PHQ-9 diagnostic validity and symptom severity with clinician-detected severity have a good correlation (0.84).[6]

The prevalence of depression varies widely in different populations, which could be attributed to different ethnicity, different cultural backgrounds and heterogeneous demography of the study populations and different screening tools. Kunik *et al*[12] observed that the prevalence of depression is 70% using the PRIME-MD in 1,334 persons with chronic breathing disorders. However, all types of chronic breathing disorders (COPD, asthma and bronchiectasis) were included in their study. We have used specific well-defined inclusion criteria in the present study to eliminate other chronic respiratory illness and co-morbidities.

The prevalence rates of depression in general population of India varies from 21% to 83% and one large study[13] from urban area of south India had reported the prevalence of depression is 25.7% among population of more than 60 years of age. The prevalence of depression in Indian COPD is lacking. In a group of 13 in-patients with chest diseases, Singh *et al*[14] had observed the prevalence of depression as 53.8 percent. Prevalence of depression in a community has a strong relationship with low level of education, poor socio-economic conditions and advanced age. All the patients in the present study were from either low or middle socio-economic families and average annual income is less than US $ 3000. 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.[15]

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.[3] Questionnaires increase the likelihood of diagnosis of depression in high risk population. However, questionnaires to determine depressive disorders can result in over estimation and may not be the same as a clinically verified event. Wagena *et al*[16] failed to show any significant association between the severity of COPD and the level of depression. Whereas, Manen *et al*[17] 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. Present study showed that the prevalence of depression increases

with the severity of COPD. Cognitive behavioural therapy, pharmacotherapy and pulmonary rehabilitation all are useful for treating depression in patients with COPD. However, the evidence for the role of anti-depressant for depression in COPD is limited. Randomised controlled trials have shown pulmonary rehabilitation improve symptoms of anxiety and depression as a consequence of training-related gains in functional capacity.[18] None of the patients in the present study were treated with any anti-depressant or were participating in any pulmonary rehabilitation programme.

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.[19] The association of smoking and depression is due to nicotine dependency rather than smoking index.[20] The population in the present study did not participate in any smoking cessation programme and 78% of them stopped smoking due to their respiratory symptoms.

The limitations of the present study need to be mentioned. The samples were selected from a single centre and all subjects were males. The clinic based 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 female from developing countries.[21] In the present study population, female patients with fixed airway obstruction had the history of exposure to other risk factors, but none were current or ex-smoker. Hence, female subjects were not enrolled in the study. Female patients with COPD are likely to have higher psychological impairment.[22]

Six patients with mild COPD were enrolled in the present study, as mild COPD patients usually do not seek regular medical advice. The prevalence of depression may be high even in mild COPD and that might increase their level of dyspnoea.[22] This may be the possible reason for the presence of relatively high depression in small number of patients with mild COPD in the present study.

CONCLUSIONS

Depressive symptoms are common in all stages of COPD and the prevalence of depression in Indian patients with COPD is high. Patients with COPD should be screened for depression and those with higher depression score should undergo further evaluation. Further studies involving larger number of subjects from several centres are required to study the prevalence of depression in Indian patients with COPD.

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