Original Article

Prevalence of Anxiety and Depression in Stable Patients with Chronic Obstructive Pulmonary Disease

Farih Yoosuf[1], Malay Sarkar[2], Dinesh Dutt Sharma[3], R S Negi[4], Sunil Sharma[5]

Authors' affiliation: [1]Consultant Pulmonologist, Santi Hospital, Omasserry; [2]Prof and Head, Dept. of Pulmonary Medicine, Indira Gandhi Medical College, Shimla; [3]Prof and Head, Dept. of Psychiatry, Indira Gandhi Medical College, Shimla; [4]Professor; [5]Associate Professor, Dept. of Pulmonary Medicine, Indira Gandhi Medical College, Shimla
Correspondence: Dr. Farih Yoosuf, Email: fari.abhayam@gmail.com, Mobile No.: 7018942026

ABSTRACT

Introduction: To study the prevalence of anxiety and depression in stable COPD patients.

Methodology: 100patients of stable COPD were assessed to look for the presence of anxiety and depression using beck anxiety inventory (BAI) and patient health questionnaire (PHQ-9). Patients already on treatment forpsychiatric illnesses were excluded from the study. Patients with total score above cut off value (BAI >7 ORPHQ-9 >4), were assessed in the psychiatry department. Quantitative data was compiled and statistical analysis was done.

Results: Among study population 68% were males, 62% were in the age group of 60-80years, 83 % were ex smokers and 92 % of them were exposed to indoor air pollution (chullahs). It was found that 64 % of the study population had psychiatric morbidity out of which 42% had mixed anxiety and depressive symptoms. Psychiatric symptoms were more prevalent in female patients (97%, P value is0.003), and in patients who had more severe disease (P value is 0.04), 6 minute walk distance < 300 m (P value is 0.00001), percentage of desaturatoin> 3% after 6 M.W (P value is 0.0001) and Smoking Index >400.Smoking status and 6 minute walk distance were independently associated with the development of anxiety and depression with significant P values in stable COPD patients.

Conclusion: Anxiety and depression are common psychiatric co-morbidities associated with COPD patients. Early diagnosis and proper management of COPD and timely evaluation for psychiatric illnesses is essential for the better outcomes in COPD patients.

Key words: Anxiety, Beck Anxiety Inventory, COPD, Depression, PHQ -9

INTRODUCTION

The global initiative for chronic obstructive lung disease (GOLD) defined chronic obstructive pulmonary disease (COPD) as a "common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases."[1]COPD is a major cause of morbidity and mortality worldwide and also poses a high socioeconomic burden. COPD is currently the fourth leading cause of death in the world and is projected to be the third leading cause of death by 2020.[1] Co-morbidities are frequent in patients with COPD and have a significant impact on the quality of life, exacerbation frequency, and survival.[2,3] Common co-morbidities seen in COPD patients are cardiovascular diseases, cancer, cachexia, osteoporosis, metabolic syndrome, skeletal muscle dysfunction, anxiety, depression, and anaemia. COPD is associated with poor nutrition and restriction in daily activities leading to an adverse impact on psychological status, and so leading to a decrease in quality of life (QOL). Commonly described psychiatric co-morbidities in COPD are depression or anxiety disorders. Depression and anxiety often occur together; it is estimated that at least half of people with depression also have anxiety.[4]Co-morbid psychological impairments in COPD patients predict increased functional impairment, disability, morbidity, lower quality of life, decreased adherence to the treatment, prolonged hospital stay, and increased mortality rate.[5,6]Depression and anxiety are often untreated or undertreated in patients with COPD. There are very few studies from India that have investigated the prevalence of both anxiety and depression in COPD patients. Therefore, this study aims to evaluate the frequency of depression and anxiety, being the commonest psychiatric co-morbidities in COPD patients, and to correlate the nature of psychiatric co-morbidity with relevant variables of COPD.

MATERIAL AND METHODS

The hospital-based cross-sectional study was conducted in the Department of Pulmonary Medicine at a tertiary care centre in the Himalayan foothills and included patients attending the pulmonary medicine outpatient department from July 2016 to June 2017. Patients excluded from this study were: those suffering from any chronic illness other than COPD or those taking oral corticosteroids; patients taking treatment for anxiety/ depression; and patients who presented with an acute exacerbation. The sample size was calculated using EPI INFO VERSION (7.1) making the assumptions: prevalence of anxiety and depression in COPD patients is approximately 45% based on previous studies[11,15 and 16], confidence level of 95%, and allowable error up to 10%. A total of 100 patients consenting for the

study were enrolled. By a detailed proforma, baseline parameters were recorded including sociodemographic data, smoking history, smoking index, dyspnoea using the modified medical research council criteria (mMRC) and GOLD staging. Exercise capacity was assessed using 6-minute walk test. Screening of the patient for the presence of anxiety or depressive symptoms was done using Beck anxiety inventory[7] and patient health questionnaire-9[8] respectively. Those patients whose total score was above the cut off value (BAI >7 OR PHQ-9 >4), were assessed in the psychiatry department in consultation with consultant psychiatry and diagnosis of anxiety or depression was made using ICD-10 diagnostic criteria.

STATISTICAL ANALYSIS

The data collected was entered into a computer in MS Excel spreadsheet 2007. Results were summarized in tables and percentages. Statistical analysis was done using SPSS FOR WINDOWS (VERSION17). Univariate analysis was done to look for the association between anxiety and depression with variables of COPD. Data were analysed and 'P' value was determined using Chi-Square test and Fischer Exact test. Logistic regression analysis was done to analyse the association of individual variables with the development of anxiety and depression. A p-value of <0.05 was considered statistically significant.

RESULTS

We included patients above the age of 40 years. Sixty-two patients were between the ages of 60 to 80 years. Thirty-two patients were between the age of 40 to 60 years and six patients were more than 80 years of age. Sixty-eight patients were males and 32 patients were females. So, the majority of the study population were males. As per refined ABCD assessment tool of GOLD 2017, 54 patients of the study population belonged to group B and 46 patients belonged to group A. Among the study population, 22 patients had a smoking index of 200 to 300 and 32 patients had a smoking index of more than 400. Nine patients were never smokers. Thirty-six patients were able to cover a distance between 300 and 400 meters in 6 minutes and 35 patients were able to cover a distance 200-300 meters. Seven patients could cover less than 200 meters. Spirometry analysis revealed that 30 patients had a mild obstruction, 32 patients had a moderate obstruction, 29 patients had a severe obstruction and 9 patients had a very severe obstruction. So, the majority of the stable COPD patients belong to GOLD 1 & 2 grades. (TABLE 1)

On the basis of Beck Anxiety Inventory (BAI) screening tool for anxiety, 89 patients among stable COPD patients included in the study had anxiety symptoms in which 27 patients had minimal anxiety symptoms, 42 had mild, 17 had moderate and 3 patients had severe anxiety symptoms, Based on the Patient Health Questionnaire -9 (PHQ-9) depression screening tool, 42 patients had depressive symptoms. Fifty-eight patients had no depressive symptoms, 38 had mild depressive symptoms and 4 patients had moderate depressive symptoms.

Sixty-four out of 100 patients were analysed in the psychiatry department and the ICD-10 diagnosis was made in all the patients. Total 42 patients had mixed anxiety and depressive symptoms, 17 patients had generalised anxiety disorder, 3 patients had other mixed anxiety disorder, one patient each had mild depressive episodes and depression with psychotic symptoms. (TABLE-2)

Severity of anxiety increases as the age increases, More severe in patients in COPD group B (P- value is 0.0004),

Table-1. Demographic and clinical profile of the study population

Variables	Number of Patients
Age	
<60 Years	32
60-80 Years	62
>80 Years	6
Sex	
Male	68
Female	32
Gold Grading	
A	46
B	54
Duration Of Disease	
<2 Years	34
2-4 Years	35
4-6 Years	12
>6 Years	19
Smoking Status	
Ex-Smoker	83
Current Smoker	8
Never Smoker	9
Smoking Index	
<200	19
200-300	22
300-400	18
>400	32
Nil	9
Indoor Air Pollution	
Present	92
Absent	8
6 M Walk Distance	
<200	7
200-300	35
300-400	36
>400	22
% Desaturation After 6 Mwt	
<3%	52
3-6%	33
>6%	15
Spirometry	
Mild Obstruction	30
Moderate Obstruction	32
Severe Obstruction	29
Very Severe Obstruction	9
BAI Grading	
Nil	11
Minimal	27
Mild	42
Moderate	17
Severe	3
PHQ-9 Grading	
None	58
Mild	38
Moderate	4

Table-2. Distribution of study population based on icd-10 diagnosis

ICD-10 Diagnosis	Patients
Mild depressive episodes(F32.0)	1(1.6%)
Depression with psychotic symptoms(F 32.3)	1(1.6%)
Generalised anxiety disorder(F 41.1)	17(26.5%)
Mixed anxiety and depressive disorder(F 41.2)	42(65.6%)
Other Mixed anxiety disorder(F 41.3)	3(4.6%)
Total	64

Table-3. Association of anxiety with different variables

Variables	Present	Absent	Pvalue
Age			0.416
>60 Years	44	24	
<60years	18	14	
Sex			**0.001**
Female	27	5	
Male	35	33	
Gold			**0.0004**
A	20	26	
B	42	12	
Duration Of Disease			0.216
>4 Years	22	9	
<4 Years	40	29	
Smoking Index			0.2315
>300	33	17	
<300	22	19	
Indoor Air Pollution			0.269
Present	59	33	
Absent	3	5	
6 Minute Walk Distance			**0.00003**
<300 Metres	36	6	
>300 Metres	26	32	
% Desaturation After 6 Mw			**0.0006**
>3%	38	10	
<3%	24	28	
Spirometry			0.05
Mild To Moderate Obstruction	34	28	
Severe To Very Severe Obstruction	28	10	

More prevalent among females (P value – 0.001). Minimal in current smokers and never smokers, Severe forms in patients who had disease for longer duration. Severity of anxiety increases as the percentage of desaturation increases and distance covered decreases after 6MW (P value – 0.00003). Severe anxiety symptoms are seen in patients with severe and very severe obstruction on spirometry (P value – 0.05). Sixty-four patients were diagnosed to have psychiatric diseases based on ICD-10 criteria of which majority of stable COPD patients had mild to moderate anxiety symptoms. (TABLE-3)

Severity of depression increases with increasing age. More prevalent in females (P value is 0.015). More frequent and severe in group B patients (P value is 0.030). Current smokers and never smokers had fewer symptoms. More depressive symptoms are seen in patients with high smoking index. More frequent and severe in patients who had severe or very severe obstruction on spirometry (P value is 0.003). (TABLE-4)

Psychiatric disorders were prevalent among all age groups. Majority had mixed anxiety and depressive symptoms. Psychiatric disorders were more prevalent among females. Out of 32 female patients, 27 (84%) had psychiatric disorders and out of 68 male patients, 37 (54%) had psychiatric disorders which showed a higher prevalence in females who had COPD (P value is 0.003). Diseases were more prevalent among patients belonging to group B who manifested with severe form of COPD than patients in Group A (P value is 0.00007). Patients who had COPD for more than 4 years duration were more prone to manifest with psychiatric symptoms. Patients who had smoking index more than 300 were having most of the psychiatric manifestations. Those patients who were able to cover less than 300 metres after 6 minute walk were more anxious or depressed and they were having mixed disorder also (P value is 0.00001). Patients who had desaturation more than 3% after 6MW were having anxiety or depression (P value is 0.0001). Those who had severe or very severe obstruction on spirometry had manifestations of anxiety, depression or mixed forms (P value is 0.04). Severity of the disease had a direct relation with the prevalence of anxiety and depression among stable COPD patients included in the study.

After applying logistic regression we could find out that smoking status and 6 minute walk distance are independently associated with the development of anxiety and depression with significant 'p' values in stable COPD patients. (TABLE-5)

DISCUSSION

COPD is currently the fourth leading cause of death in the world and is projected to be the 3rd leading cause of death by 2020. Based on Burden of Obstructive Lung Disease (BOLD) study and other large epidemiological studies, the global prevalence of COPD is 11.7%.[9,10] The presence of various comorbidities is a characteristic feature of COPD. Commonly described psychiatric comorbidities in COPD are depression or anxiety disorders. This study was conducted to estimate the prevalence of anxiety and depression in stable COPD patients and to correlate the nature of psychiatric disorder with relevant variables of COPD.

In this study, 62% of COPD patients had anxiety symptoms and 42% patients had depressive symptoms which show that anxiety symptoms are more common than depressive symptoms in stable COPD patients. Chaudhary et al[11] reported an overall frequency of psychiatric comorbidities as 28.4%. Marko et al. yielded prevalence in the COPD group of 18.8% and 28.2% for depression and anxiety respectively, study revealed a higher prevalence among women.[12]Kunik et al. in a randomised controlled trial screened 1,334 patients and showed the presence of both depression and anxiety in 862 patients (65%). One hundred and thirty-three patients (10%) had anxiety only whereas, 72 patients (5%) had only depression.[13]Negiet al[14] reported a prevalence of 49.2% extending from mild to severe depressive symptoms. Sajel et al[15] reported that the cumulative prevalence of depression in COPD was 72%. In the study by Waseem et al. depression was found in 69(57.02%) cases, whereas 44(36.37%) subjects were having anxiety.[16]

Table-4. Association of depression with different variables

Variables	Present	Absent	P value
Age			0.29
>60 Years	31	37	
<60years	11	21	
Sex			**0.015**
Female	19	13	
Male	23	45	
Gold			**0.030**
A	14	32	
B	28	26	
Duration of Disease			0.385
>4 Years	15	16	
<4 Years	27	42	
Smoking Index			0.50
>300	23	27	
<300	16	25	
Indoor Air Pollution			0.530
Present	40	52	
Absent	2	6	
6 Minute Walk Distance			**0.002**
<300 Metres	25	17	
>300 Metres	17	41	
% Desaturation After 6 Mw			0.250
>3%	23	25	
<3%	19	33	
Spirometry			**0.003**
Mild to Moderate Obstruction	19	43	
Severe to Very Severe Obstruction	23	15	

Table-5. Logistic regression analysis

Variables	Beta	SE	P – Value
Smoking Status	2.15	0.649	0.001
6 Minute Walk Distance	-4.114	1.488	0.006

SE=Standard Error

Table-6. Percentage of prevalence of anxiety and depression in stable copd patients

Variables	Percentage
Totale Prevalence	64%
Among Males	54%
Among Females	84%
Mixed Anxiety And Depressive Disorder	42%
Anxiety Disorder	20%
Depressive Disorder	2%

Our study showed a higher prevalence of psychiatric disorders in females who had COPD (P value is 0.003). Waseem et al[16] also reported that the probability of having anxiety was more in female (OR 1.667, CI: 1.023-2.714). Schneider et al[17] in the follow-up analysis found an increased risk of developing an incident diagnosis of depression among patients with COPD as compared with patients without COPD, particularly in women showing that the lifetime prevalence of depression is twice as high in women as in men. Women are more prone to psychological causes of depression than men. Studies showed that oestrogen may have a protective effect on the pathology that underlies depression and that decreases in oestrogen may increase the risk for depression. In the male brain, testosterone is converted into oestrogen by endogenous aromatase (CYP19). Since testosterone does not cycle in men as oestrogen does in women, there may be a more consistent protection in men.[18]

Smoking is the well-studied risk factor for COPD; however, there is consistent evidence from epidemiological studies that nonsmokers may also develop chronic airflow limitation. Out of 100 patients, 83 patients were ex-smokers, 8 patients were current smokers and 9 patients were never smokers. Nicotine use produces a feeling of pleasure and relaxation. Common withdrawal symptoms include anxiety, difficulty concentrating, irritability, and strong cravings for tobacco.[19]In our study, the anxiety and depressive symptoms were more common among ex-smokers and past history of smoking was independently associated with the development of anxiety and depression with significant 'P' value (0.001). Those who were current smokers had no symptoms of anxiety and depression. This might be because of the pleasurable and relaxation effects of nicotine.

Other types of tobacco like pipe, cigar, water pipe, and marijuana are also risk factors for COPD. Occupational exposures including organic and inorganic dust, chemical agents and fumes are under-appreciated risk factors for COPD.[20] Wood, animal dung, crop residues and coal, typically burned in open fires or poorly functioning stoves may lead to very high levels of indoor air pollution. In our study population, 92 patients were exposed to indoor air pollution in the form of biomass exposure like burning woods and cow dung, which shows a significant prevalence of indoor air pollution in the state of Himachal Pradesh. This shows an important risk factor for the occurrence of COPD in never smokers.

6-minute walk distance (6MWD) was independently associated with the prevalence of anxiety and depression in COPD patients (P value is 0.006). 6MWT is a part of BODE index and is used to assess the exercise capacity. Lou et al[21] in a case-controlled study had shown that subjects who were anxious and depressive walked a shorter six-minute walking distance (6MWD), had more dyspnea, a higher BODE index, and lower quality of life. The prevalence of psychiatric disorders is directly related to the severity of disease which is in accordance with other studies.[22,11,23,24,25]

We observed that patients who had COPD for a longer duration, those with high smoking index and those patients who had more severe COPD were more prone to have manifestations of anxiety, depression or mixed form. This shows that psychiatric manifestation has a direct relation with severity of the disease i.e. COPD. Chaudhary et al. [11]also stated that the frequency of psychiatric comorbidities in COPD patients increased with the severity of COPD, in patients with duration of symptoms <5 years, the frequency was 22.8% compared to the frequency of 66.67% in patients with symptoms more than 10 years ($p < 0.001$).Evan Atlantis in a systematic review and meta-analysis reports that people with depression or anxiety had a 43% increased risk of COPD outcomes, and patients with COPD and depression or anxiety had a 31% increased risk of exacerbation. People with COPD had a 55% to 69% increased risk of developing depression and

he highlights the bidirectional association between COPD and psychiatric co-morbidities.[22]

Our study has its own limitations. As the study was conducted for a period of 1 year duration, follow up of the patients could not be done. We could include only 100 patients in the study due to the lack of time and resource and majority of the study population were of low socioeconomic status which could be an independent risk factor for anxiety and depression. Another multicentre large observational study can be planned in the future to confirm the results of the study.

CONCLUSIONS

COPD is a leading cause of morbidity and mortality that is inducing both social and economic burden which is increasing. It is a systemic disease associated with multiple co-morbidities and psychiatric disorders are important among them. Psychiatric disorders were prevalent among all age groups. Majority had mixed anxiety and depressive symptoms (42%). Severity of the disease had a direct relation with the prevalence of anxiety and depression among stable COPD patients included in the study. Psychiatric disorders usually decrease adherence to COPD treatments. So, early diagnosis, proper management and adequate control of both COPD and psychiatric co-morbidities are essential for both physical and mental well-being of the patient.

REFERENCES

1. From the Global Strategy for the Diagnosis, Management and Prevention of COPD. Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017. Available from: http://www.goldcopd.org/.
2. Putcha N, Puhan MA, Hansel NN, Drummond MB, Boyd CM. Impact of co-morbidities on self-rated health in self-reported COPD: an analysis of NHANES 2001–2008. COPD. 2013; 10(3):324–332.
3. Divo M, Cote C, de Torres JP, Casanova C, Marin JM, Pinto-Plata V, et al. Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J RespirCrit Care Med. 2012;186(2):155–161
4. Tyrer P. The case for cothymia: mixed anxiety and depression as a single diagnosis. Br J Psychiatry. 2001; 179:191–193.
5. Tselebis A, Pachi A, Ilias I, Kosmas E, Bratis D, Moussas G, Tzanakis N. Strategies to improve anxiety and depression in patients with COPD: a mental health perspective. Neuropsychiatric Dis Treat. 2016 Feb 9; 12:297-328.
6. Pooler A, Beech R. Examining the relationship between anxiety and depression and exacerbations of COPD which result in hospital admission: a systematic review. Int J Chron Obstruct Pulmon Dis. 2014;9: 315–330
7. Beck A T, Epstein N, Brown G, & Steer R A. (1988). An inventory for measuring clinical anxiety: psychometric properties. Journal of Consulting and Clinical Psychology, 56: 893–897.
8. Spitzer RL, Kroenke K, Williams JBW. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. JAMA 1999; 282: 1737-44.
9. Buist AS, McBurnie MA, Vollmer WM, Gillespie S, Burney P, Mannino DM, et al. International variation in the prevalence of COPD (the BOLD Study): A population-based prevalence study. Lancet 2007;370:741-50
10. Lamprecht B, McBurnie MA, Vollmer WM, Gudmundsson G, Welte T, Nizankowska-Mogilnicka E et al. COPD in never smokers: a population based burden of obstructive lung disease study. Chest 2011; 139(4): 752-63.
11. Chaudhary SC, Nanda S, Tripathi A, Sawlani KK, Gupta KK, Himanshu D, et al. Prevalence of psychiatric comorbidities in chronic obstructive pulmonary disease patients. Lung India 2016; 33:174-8.
12. Di Marco F, Verga M, Reggente M, Maria C F, Santus P, Blasi F et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. Respiratory Medicine (2006) 100: 1767–1774.
13. Kunik ME, Roundy K, Veazey C, Souchek J, Richardson P, Wray NP et al. Surprisingly High Prevalence of Anxiety and Depression in Chronic Breathing Disorders. CHEST 2005; 127:1205–1211).
14. Negi H, Sarkar M, Raval AD, Pandey K, Das P. Presence of depression and its risk factors in patients with chronic obstructive pulmonary disease. Indian J Med Res. 2014 Mar; 139(3): 402–408.
15. De S. Prevalence of depression in stable chronic obstructive pulmonary disease. Indian J Chest Dis Allied Sci. 2011 Jan-Mar; 53(1):35-9.
16. Waseem SMA, Hossain M, Azmi SA, Rizvi SAA, Ahmad Z, Zaidi SH. Assessment of anxiety and depression in COPD patients- a pilot study. Current neurobiology 2012; 3(2):112-116.
17. Schneider C. COPD and risk of depression. Chest 2010; 137(2):341–347.
18. Albert P R. Why is depression more prevalent in women. J Psychiatry Neurosci 2015;40(4)
19. Doering P L, Li R M. Substance-related disorders II: Alcohol, nicotine, and caffeine. In Pharmacotherapy: A Pathophysiologic Approach, 9th ed. DiPiro J T, Talbert R L, Yee G C, Matzke G R, Wells B G, Posey L M; The McGraw-Hill Companies: New York, NY, USA, 2014.
20. Paulin LM, Diette GB, Blanc PD, Putcha N, Eisner MD, Kanner RE et al. occupational exposures are associated with worse morbidity in COPD. AJRCC med 2015;191(5):557-65.
21. Lou P, Zhu Y, Chen P, Zhang P, Yu J, Zhang N et al. Prevalence and correlations with depression, anxiety, and other features in outpatients with chronic obstructive pulmonary disease in China: a cross-sectional case control study. BMC Pulmonary Medicine. 2012;12:53.
22. Atlantis E, Fahey P, Cochrane B, Smith S. Bidirectional associations between clinically relevant depression or anxiety and COPD: a systematic review and meta-analysis. Chest. 2013 Sep; 144(3):766-777.
23. Dua R, Das A, Kumar A, Kumar S, Mishra M, Sharma K. Association of comorbid anxiety and depression with chronic obstructive pulmonary disease. Lung India 2018; 35:31-6.
24. Miravitlles M, Molina J, Quintano J A. Campuzano A, Perez J, Roncero C et al. Factors associated with depression and severe depression in patients with COPD. Respir Med. 2014 Nov; 108(11):1615-25.
25. Eisner MD, Blanc PD, Yelin EH, Katz PP, Sanchez G, Iribarren C et al. Influence of anxiety on health outcomes in COPD. Thorax 2010; 65(3): 229-34.