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Original Article

PSYCHIATRIC COMORBIDITIES IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

REWA SOOD[1], GAGANDEEP AHUJA[2], SHIVAM SHARMA[3*], DINESH DUTT SHARMA[4], MONICA[5], SACHIN[6], MALAY SARKAR[7]

[1]M. D. Psychiatry, Regional Hospital Una, India. [2,6]M. D. Psychiatry, Dr YSPGMC, Nahan, India. [3*]Department of Psychiatry, AIIMS Bilaspur, India. [4]Department of Psychiatry, IGMC, Shimla, India. [5]Department of Medicine, DMC Ludhiana, India. [7]Department of Pulmonary Medicine, IGMC, Shimla, India

*Corresponding author: Rewa Sood; Email: shivam9010@gmail.com

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ABSTRACT

Objective: COPD often exists with comorbidities that may have a significant impact on prognosis. Patients with COPD are predisposed to both cognitive and psychiatric disorders. Anxiety and depression are common and important comorbidities in patients with chronic obstructive pulmonary disease (COPD). Regarding this, there is a lack of data from state of Himachal Pradesh.

Methods: Our study was a cross-sectional study wherein 100 patients who attended the Pulmonary Medicine outpatient clinic of IGMC, Shimla were recruited. Patients were evaluated using tools International Classification of Disease, 10threvision, MINI 6.0, Addenbrooke's Cognitive Examination, Hamilton Anxiety Rating Scale, Hamilton Depression Rating Scale.

Results: About two-third (62%) of the patients were found to have psychiatric co-morbidities. The most common psychiatric co-morbidity was found to be mixed anxiety and depression in 20% of the patients followed by unspecified anxiety disorder in 12% of the patients,9% of the patients were diagnosed with dementia while 6% were found to have a major depressive disorder. As per our observation, the severity of anxiety and depressive symptoms as per the HARS scale and HAMD scales, respectively, increased as the severity of the disease increased.

Conclusion: The present study shows that about two third (62%) of the patients were found to have psychiatric co-morbidities. Psychiatric comorbidities have a significant impact on quality of life, exacerbation frequency and survival. Another multicentre large observational study can be planned in the future to overcome the above problems.

Keywords: COPD, Comorbidities, Anxiety and Depression, Cross-sectional Study, Psychiatric Co-morbidities

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INTRODUCTION

The Global Initiative on 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 and gases and influenced by host factors including abnormal lung development. Significant comorbidities may have an impact on morbidity and mortality" [1]. COPD is now one of the top three causes of death worldwide and 90% of these deaths occur in low-and middle-income countries (LMICs). More than 3 million people died of COPD in 2012, accounting for 6% of all deaths globally. The pathology of COPD encompasses a variety of pathologic lesions in the airways, lung parenchyma, and pulmonary vasculature, and these lesions can be correlated, to a greater or lesser degree, with changes in pulmonary function tests and clinical appearances [1]. COPD often exists with comorbidities that may have a significant impact on prognosis. Some of the co-morbidities may develop independently of COPD, while others are causally related to COPD, often by shared risk factors. Comorbidities develop at any stage of severity of COPD. Comorbidities have a significant impact on quality of life, exacerbation frequency and survival [2, 3]. Comorbidities also increase the cost of treatment [4]. Patients with COPD are predisposed to both cognitive and psychiatric disorders. Anxiety and depression are common and important comorbidities in patients with chronic obstructive pulmonary disease (COPD). Risk factors for anxiety and depression in COPD include smoking, excessive dyspnoea and the development of disease in later stages of life when patients are more likely to experience age-related losses. The pathophysiology of these psychological comorbidities in COPD is complex and possibly explained by common risk factors, response to symptomatology and biochemical alterations. High prevalence rates of cognitive dysfunctions have been reported for COPD. The hypoxemia seen in some patients with COPD seems to be a crucial factor for cognitive impairment because it affects the oxygen-dependent enzymes that are important in the synthesis of neurotransmitters such as acetylcholine [5]. Psychiatric comorbidities in COPD patients are often untreated or undertreated. Though there is a lot of extensive literature addressing this concern in the West, but there are only a few studies that have been carried out in India. Hence the current study was planned to evaluate the psychiatric comorbidities along with cognitive dysfunctions in patients with COPD so that further interventions can be done in the affected areas and strategies made accordingly to further improve the quality of life and decrease psychiatric comorbidities in patients diagnosed with COPD.

MATERIALS AND METHODS

The study was conducted at Indira Gandhi Medical College (IGMC), Shimla, which is a tertiary care centre of Himachal Pradesh.

Study design

It was a cross-sectional study which was carried out in patients diagnosed with COPD.

Study population and sample size

The study included all consecutive patients who attended the Pulmonary Medicine outpatient clinic of IGMC, Shimla from 1st March 2020 to 28 February 2021 who have been diagnosed with COPD. The patients were evaluated for psychiatric comorbidities in the Psychiatry department. The patients fulfilling following inclusion

and exclusion criteria after obtaining informed consent were enrolled for the study. COPD diagnosis was based on relevant symptoms risk factors followed by confirmation of diagnosis by post-bronchodilators spirometry (airflow limitation was diagnosed by a FEV_1/FVC ratio of<0.70) [51] One hundred patients were included for the study. Sample size was calculated using formula [3.84*p(100-p)/l^2+10% non-responder rate) where p=prevalence of psychiatric comorbidities in COPD in previous studies (avg =31.3%) and l= alpha error taken as 10%].

Inclusion criteria

1. Stable patients of COPD (Stable COPD patients was defined by the absence of exacerbations in preceding/past 6 w.)
2. Patients willing to participate in the study.

Exclusion criteria

1. Patients already taking medication for any psychiatric illness.
2. Patients who present with acute exacerbation
3. Suffering from any chronic illness other than COPD

Instruments and tools

Patients meeting all the inclusion criteria and having none of the exclusion criterion were recruited for the present study. Demographic data was recorded the sociodemographic data like age, sex, income of family, residence, and type of family were recorded in a semi-structured performa. Clinical details were recorded in clinical profile sheet. The presence of COPD was defined by GOLD criteria. Spirometric staging and mmol RC dyspnoea scale were applied. Screening of the patients who had COPD for the presence of psychiatric co-morbidities was done by MINI [6] questionnaire. ICD-10 [7] was applied for the final Psychiatric diagnosis. HARS [8] and HAM-D [9] scales were applied for the severity of anxiety and depression, respectively. Addenbrooke's Cognitive Examination [10] was used to identify cognitive impairment. The relationship between COPD and the different study variables was examined using relevant statistical tools.

Statistical analysis

Data was analysed using statistical software Epi Info version 7.2.0.1. The categorical and continuous variables were reported as percentages and Mean+/-SD, respectively. The differences in the distribution of categorical and continuous variables were compared by using a chi-square test and unpaired t-test, respectively. 2-tailed value of<0.05 was taken as statistically significant.

RESULTS

One-year cross-sectional study was conducted with the aim to assess the prevalence of psychiatric co-morbidities in patients with COPD and to assess the relationship of psychiatric co-morbidities in these patients with relevant sociodemographic and clinical variables. A total of 100 patients who fulfilled the inclusion criteria were recruited in the study after obtaining informed consent.

Prevalence of various psychiatric co-morbidities in the study population

62% (n=62) of the patients were diagnosed with various psychiatric illnesses. The most common among the psychiatric co-morbidities was found to be the presence of mixed anxiety and depression (n=20;20%) followed by anxiety disorder unspecified (n=12;12%). 9%(n=9) of the patients were found to have dementia, while 6% (n=6) were found to have non-organic insomnia (table 1/fig. 1).

Table 1: Prevalence of various psychiatric co-morbidities (n=100)

Primary psychiatry diagnosis	No of patients	Percent
Nil psychiatry	38	38.00%
Dementia	9	9.00%
Alcohol dependence	2	2.00%
Intentional self-harm	0	0.00%
Major depressive disorder	6	6.00%
Mixed anxiety and depression	20	20.00%
Generalized Anxiety disorder	2	2.00%
Anxiety disorder unspecified	12	12.00%
Non organic insomnia	6	6.00%
Somatoform disorder	1	1.00%
Panic Disorder	3	3.00%
Bipolar affective disorder	1	1.00%
Schizophrenia and other psychotic disorders	0	0.00%

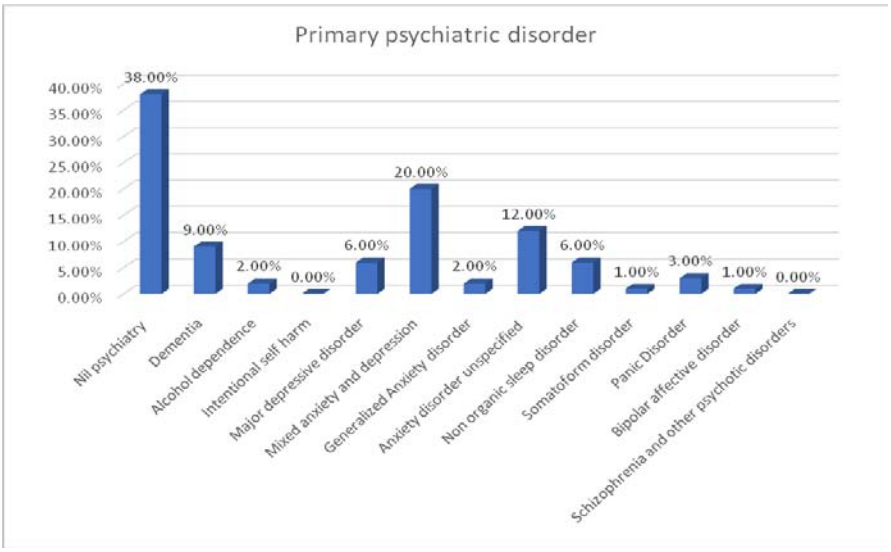

Fig. 1: Prevalence of various psychiatric co-morbidities (n=100)

Distribution of study population according to Hamilton Anxiety Rating Scale (HARS)

As per our observation, 49% (n=49) of the patients had the presence of anxiety symptoms as per HARS scale (table 2/fig. 2).

Distribution of study population according to hamilton depression rating scale (HAM-D)

Among our study population,31%(n=31) of the patients had presence of depressive symptoms as per HAM-D scale (table 3/fig. 3).

Table 2: Distribution of study population according to hars scoring (n=100)

HARS	No of patients	Percent
Not present	51	51.00%
Mild severity	10	10.00%
Mild to moderate severity	19	19.00%
Moderate to severe	20	20.00%

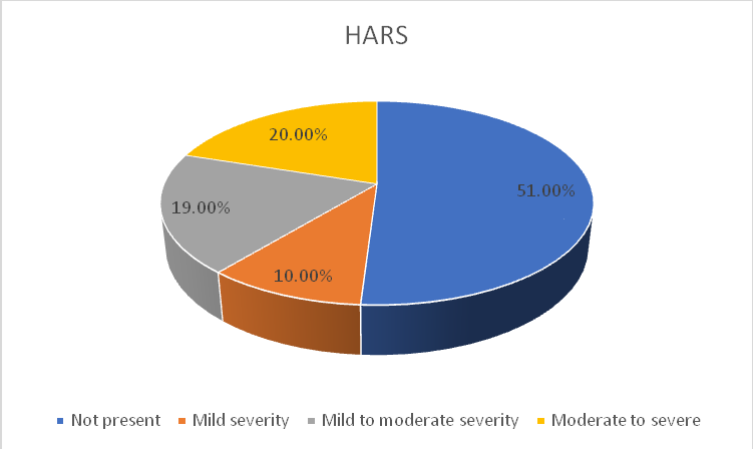

Fig. 2: Distribution of study population according to hars scoring (n=100)

Table 3: Distribution of study population according to HAM-D scale (n=100)

HAM-D	Percent	No of patients
No depression	69.00%	69
Mild depression	5.00%	5
Moderate depression	14.00%	14
Severe depression	12.00%	12

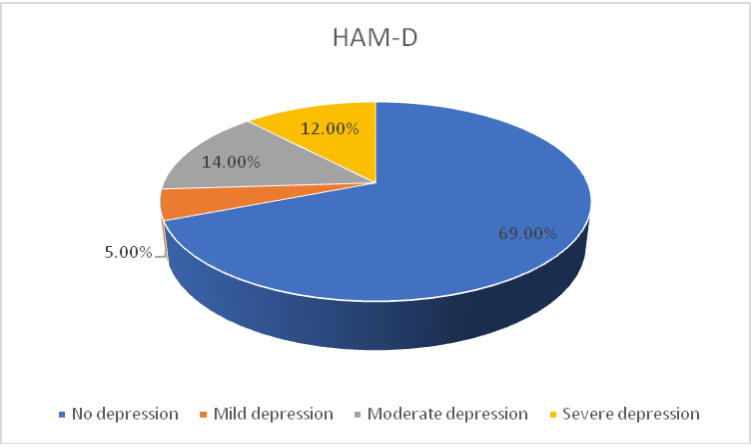

Fig. 3: Distribution of study population according to HAM-D scale (n=100)

Distribution according to addenbrooke's cognitive examination iii score

In our study population, 23%(n=100) of the patients had presence of cognitive dysfunction. 15% (n=15) of the population had presence of mild cognitive dysfunction, while 8%(n=8) had presence of moderate cognitive dysfunction (table 4/fig. 4).

Association of anxiety with different variables

The association of anxiety with age>60 y, female gender, rural background, grade 3 and 4 dyspnoea on mmolRC scale, GOLD staging C and D and severe to very severe obstruction on spirometric staging was found to be statistically significant on univariate analysis (p value<0.05) (table 5).

Table 4: Distribution according to addenbrooke's cognitive examination III score (n=100)

ACE 3	No of patients	Percent
>82(normal cognitive function)	77	77.00%
62-81(mild cognitive dysfunction)	15	15.00%
<62(moderate cognitive dysfunction)	8	8.00%

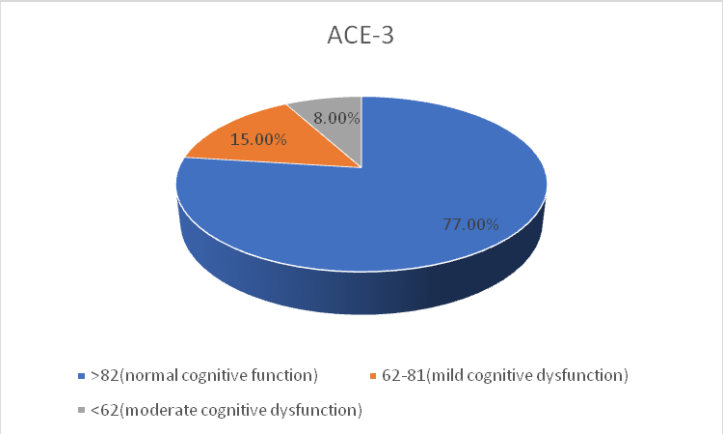

Fig. 4: Distribution according to addenbrooke's cognitive examination III score (n=100)

Table 5: Association of anxiety with different variables (n=100)

Variables	Present	Absent	P value
AGE			
<60 Y	15	25	0.0325
>60 Y	34	26	
Locality			
Rural	39	31	0.0219
Urban	20	10	
Sex			
Female	21	6	0.0002
Male	28	45	
Socioeconomic status			
U-UM	7	14	0.057
LM-L	42	37	
mMRC dyspnoea scale			
grade 1and2	31	48	0.00007
grade 3and4	18	3	
Gold staging			
A and B	29	47	0.00005
C and D	20	4	
COPD duration			
<10 Y	28	36	0.0851
>10 Y	21	15	
Spirometric staging			
Mild to moderate obstruction	33	50	0.00001
Severe to very severe obstruction	16	1	

Multivariate logistic regression analysis

Multivariate logistic regression analysis was performed and the severity of mmol RC dyspnoea scale and female gender were found to be independent risk factors for development of anxiety (table 6).

Association of anxiety symptoms with gender

As per our observation, female patients had a higher prevalence (77.77%; n=21) of anxiety symptoms and more severity of anxiety symptoms as compared to male patients (38.35%; n=28) (table 7/fig. 5)

Table 6: Multivariate logistic regression analysis

		B	S. E.	Wald	Df	Sig.	Exp(B)	95.0% C. I. for EXP(B)	
								Lower	Upper
Step 1[a]	Locality	.388	.578	.450	1	.502	1.473	.475	4.572
	GOLD staging	.951	.785	1.470	1	.225	2.588	.556	12.047
	Spirometric staging	2.699	1.146	5.551	1	.018	14.868	1.574	140.419
	mMRC dyspnoea scale	1.592	.867	3.370	1	.066	4.912	.898	26.878
	Sex (F)	-2.338	.590	15.683	1	<0.001	.097	.030	.307
	Age	-.188	.571	.109	1	.742	.828	.270	2.537
	Constant	.730	.687	1.132	1	.287	2.076		

Table 7: Association of anxiety symptoms with gender (N=100)

Sex	Not present	Hamilton Anxiety Rating Scale (HARS)		
		Mild severity	Mild to moderate severity	Moderate to severe
Female	6	0	11	10
	22.22%	0%	40.74%	37.04%
Male	45	10	8	10
	61.64%	13.70%	10.96%	13.70%

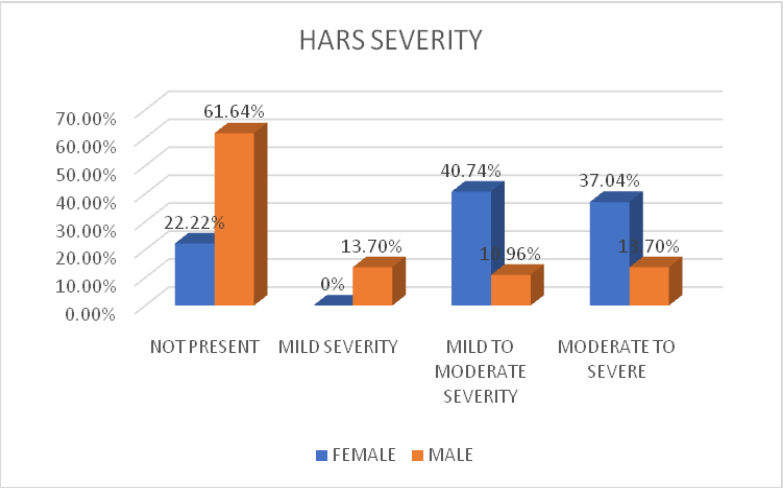

Fig. 5: Association of anxiety symptoms with gender (N=100)

Association of anxiety symptoms with age

As per our observation, most of the patients (n=25;62.50%) with age less than 60 y had no symptoms of anxiety. As the age of the patients increased, the severity of anxiety symptoms as per HARS scale had also increased. About 46.15%(n=6) of the patients having age more than 80 y had severe anxiety symptoms (table 8/fig. 6).

Table 8: Association of anxiety symptoms with age (n=100)

AGE	H ARS			
	Not present	Mild	Mild to moderate	Severe
<60 Y	25	6	4	5
	62.50%	15.00%	10.00%	12.50%
60-80 Y	22	3	13	9
	46.81%	6.38%	27.66%	19.15%
>80 Y	4	1	2	6
	30.77%	7.69%	15.38%	46.15%

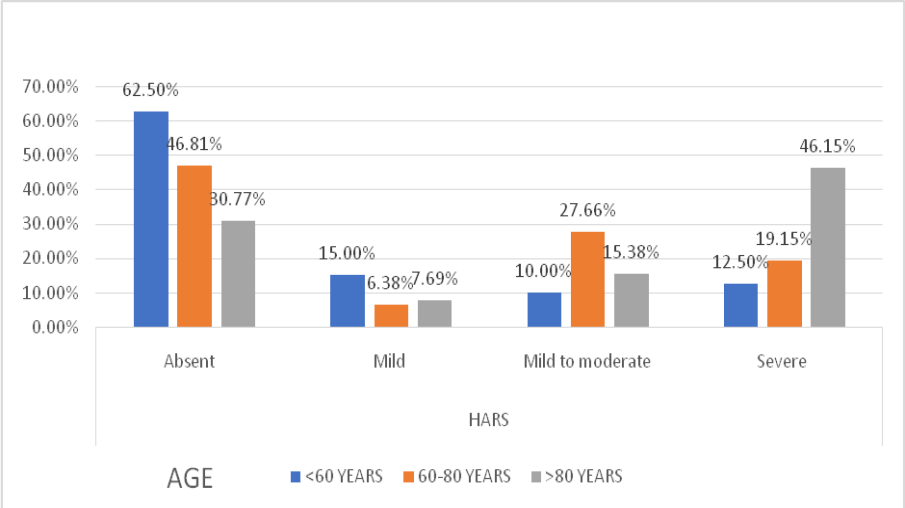

Fig. 6: Association of anxiety symptoms with/age (n=100)

Association of severity of anxiety symptoms with mmol RC dyspnoea scale

As per our observation, most of the patients (n=36;73.47%) with mmol RC grade 1 had no symptoms of anxiety. As the grade of mmol RC increased, the severity of anxiety symptoms as per HARS scale had also increased.

About 42.86% (n=9) of the patients having mmol RC grade 3 shortness of breath had severe anxiety symptoms. (table 9/fig. 7)

Table 9: Association of severity of anxiety symptoms with mmolRC dyspnoea scale (n=100)

mMRC dyspnoea scale	HARS			
	Absent	Mild	Mild to moderate	Severe
1	36	6	5	2
	73.47%	12.24%	10.20%	4.08%
2	12	2	7	9
	40.00%	6.67%	23.33%	30.00%
3	3	2	7	9
	14.29%	9.52%	33.33%	42.86%

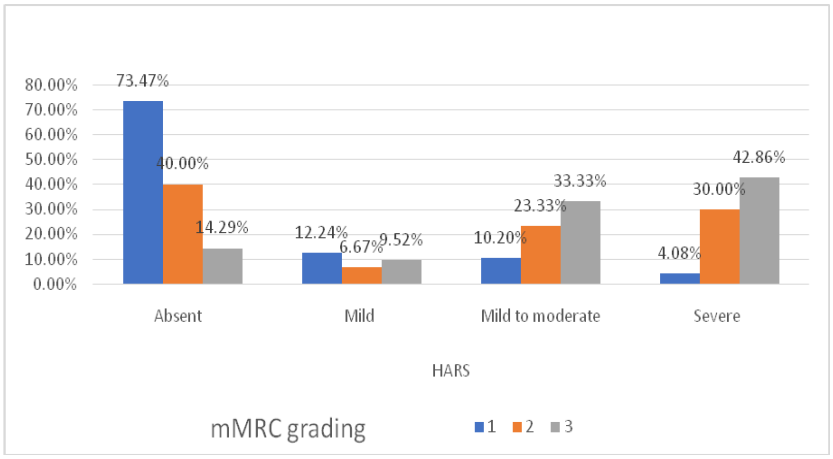

Fig. 7: Association of severity of anxiety symptoms with mmol RC dyspnoea scale (n=100)

Association of anxiety symptoms with gold staging

As per our observation, most of the patients(n=33;67.35%) with GOLD Staging A had no symptoms of anxiety. As the GOLD staging increased, the severity of anxiety symptoms as per HARS scale also increased. About 50%(n=5) of the patients having GOLD stage D had severe anxiety symptoms. (table 10/fig. 8)

Association of anxiety symptoms with duration of COPD

As per our observation, most of the patients (n=21;63.64%) with shorter duration of illness i. e less than 5 y, had no symptoms of anxiety. As the duration of the illness increased, the severity of anxiety symptoms as per HARS scale also increased. About 46.15% (n=6) of the patients with a duration of illness more than 15 y had severe anxiety symptoms. However, the association was not found to be statistically significant. (P value-0.0851) (table 11/fig. 9).

Association of anxiety symptoms with spirometric grading

As per our observation, most of the patients (n=30;73.17%) with mild obstruction had no symptoms of anxiety. As the severity of obstruction increased, the severity of anxiety symptoms as per HARS scale also increased. (table 12/fig. 10).

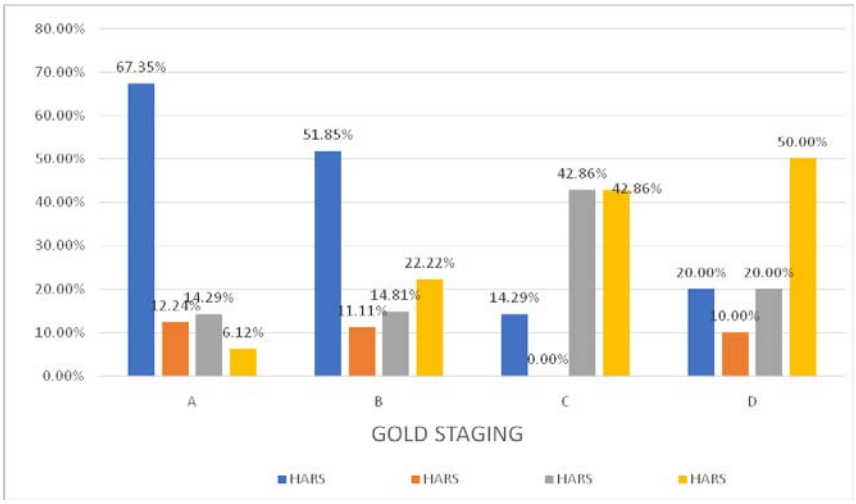

Fig. 8: Association of anxiety symptoms with gold staging (n=100)

Table 10: Association of anxiety symptoms with gold staging (n=100)

Gold staging	HARS			
	Not present	Mild	Mild to moderate	Severe
A	33	6	7	3
	67.35%	12.24%	14.29%	6.12%
B	14	3	4	6
	51.85%	11.11%	14.81%	22.22%
C	2	0	6	6
	14.29%	0.00%	42.86%	42.86%
D	2	1	2	5
	20.00%	10.00%	20.00%	50.00%

Table 11: Association of anxiety symptoms with duration of COPD (N=100)

COPD duration	HARS			
	Not present	Mild	Mild to moderate	Severe
<5 y	21	4	4	4
	63.64%	12.12%	12.12%	12.12%
5-10 y	15	4	9	3
	48.39%	12.90%	29.03%	9.68%
10-15 y	11	2	3	7
	47.83%	8.70%	13.04%	30.43%
>15 y	4	0	3	6
	30.77%	0.00%	23.08%	46.15%

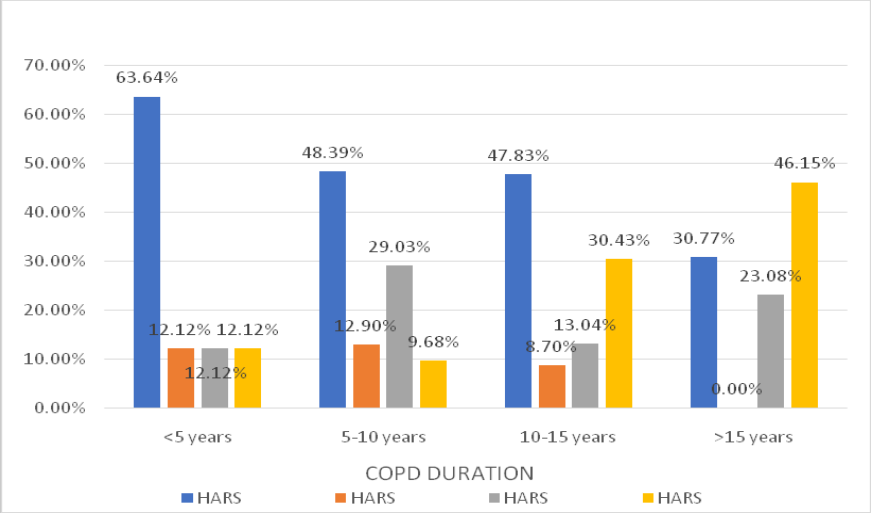

Fig. 9: Association of anxiety symptoms with duration of COPD (n=100)

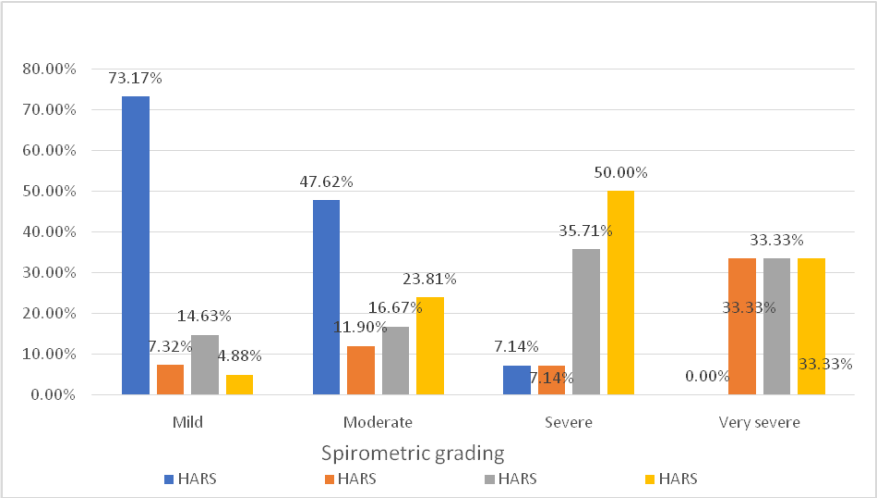

Fig. 10: Association of anxiety symptoms with spirometric grading (n=100)

Table 12: Association of anxiety symptoms with spirometric grading (n=100)

Spirometric staging	HARS			
	Not present	Mild	Mild to moderate	Severe
Mild	30	3	6	2
	73.17%	7.32%	14.63%	4.88%
Moderate	20	5	7	10
	47.62%	11.90%	16.67%	23.81%
Severe	1	1	5	7
	7.14%	7.14%	35.71%	50.00%
Very severe	0	1	1	1
	0.00%	33.33%	33.33%	33.33%

Association of depression with different variables

The association of depression with age>60 y, lower socioeconomic status, grade 3 and 4 dyspnoea on mmolRC scale, GOLD staging C and D, duration of illness for more than 10 y, severe to very severe obstruction on spirometric staging was found to be statistically significant on univariate analysis (p value<0.05) (table 13).

Table 13: Association of depression with different variables

Variables	Present	Absent	P Value
Age			
<60 Y	8	32	0.0275
>60 Y	23	37	
Locality			
RURAL	23	47	0.2780
URBAN	8	22	
Sex			
FEMALE	9	18	0.3784
MALE	22	51	
Socioeconomic status			
U-UM	2	19	0.0007
LM-L	29	50	
mMRC dyspnoea scale			
grade 1and2	64	15	0.0001
grade 3and4	16	5	
Gold staging			
A and B	13	63	0.0001
C and D	18	6	
COPD duration			
<10 Y	12	52	0.0003
>10 Y	19	17	
Spirometric staging			
Mild to moderate obstruction	18	65	0.0001
Severe to very severe obstruction	13	4	

Multivariate logistic regression analysis

Multivariate logistic regression analysis was performed and severity of mmolRC dyspnoea scale was found to be an independent risk factor for development of depression (table 14).

Association of depressive symptoms with gender

As per our observation, there was no significant difference in prevalence of depressive symptoms among male and female patients.33% of females and 30% of males had the presence of depressive symptoms (table 15/fig. 11).

Association of severity of depressive symptoms with age

As per our observation, majority patients (80%; n=32) with age less than 60 y had no symptoms of depression. As the age of the patients increased, the severity of depressive symptoms as per HAMD scale had also increased. About 30.77% (n=4) of the patients having age more than 80 y had severe anxiety symptoms (table 16/fig. 12).

Table 14: Multivariate logistic regression analysis

Variables in the equation									
		B	S. E.	Wald	df	Sig.	Exp(B)	95.0% C. I. for EXP(B)	
								Lower	Upper
Step 1[a]	GOLD staging	1.277	.725	3.101	1	.078	3.587	.866	14.866
	Spirometric staging	.954	.795	1.438	1	.230	2.596	.546	12.338
	mMRC dyspnoea scale	1.545	.785	3.879	1	**.049**	4.689	1.008	21.819
	Age	-.457	.629	.528	1	.467	.633	.185	2.172
	Socioeconomic status	1.262	.933	1.827	1	.176	3.531	.567	21.998
	COPD duration	.655	.604	1.176	1	.278	1.926	.589	6.294
	Constant	-2.772	.910	9.275	1	.002	.063		

Table 15: Association of depressive symptoms with gender (n=100)

Hamilton depression rating scale (HAMD)				
Sex	**Not present**	**Mild**	**Moderate**	**Severe**
Female	18	2	3	4
	66.67%	7.41%	11.11%	14.81%
Male	51	3	11	8
	69.86%	4.11%	15.07%	10.96%

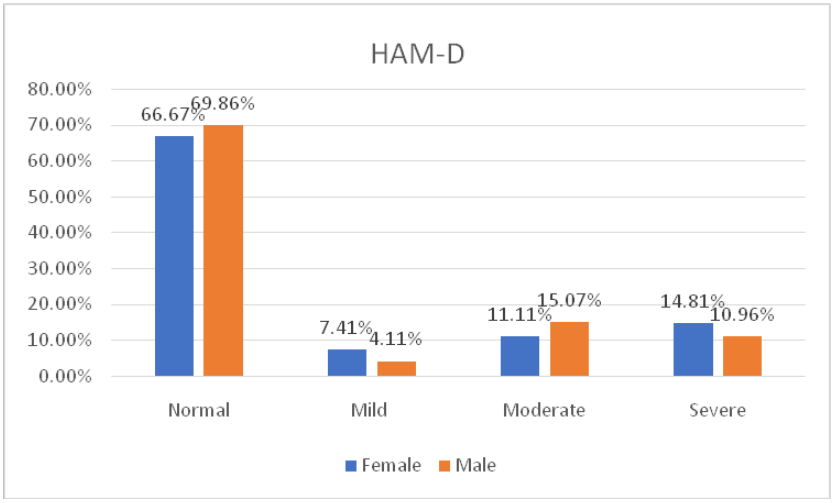

Fig. 11: Association of depressive symptoms with gender (n=100)

Table 16: Association of severity of depressive symptoms with age (n=100)

Duration	HAM-D			
Age	**Not present**	**Mild**	**Mild to moderate**	**Moderate to severe**
<60 Y	32	4	2	2
	80.00%	10.00%	5.00%	5.00%
60-80 Y	31	0	10	6
	65.96%	0.00%	21.28%	12.77%
>80 Y	6	1	2	4
	46.15%	7.69%	15.38%	30.77%

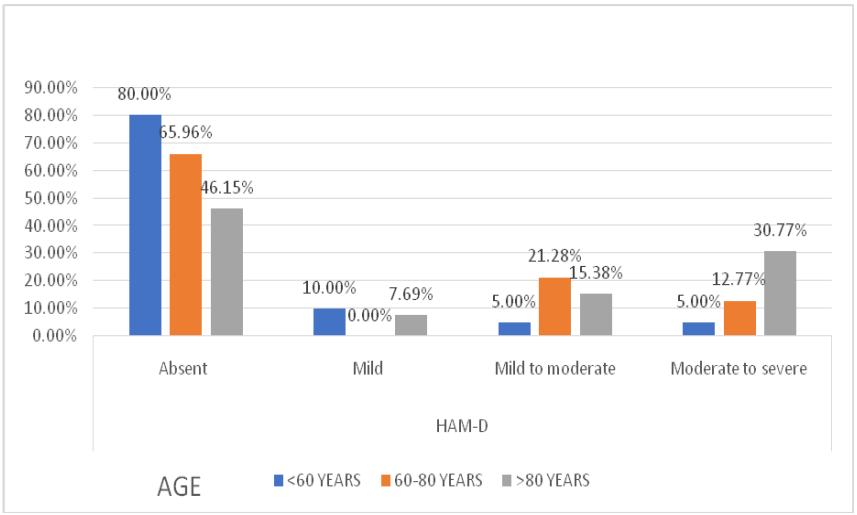

Fig. 12: Association of severity of depressive symptoms with age (n=100)

Association of depressive symptoms with mMRC dyspnoea scale

As per our observation, majority patients (91.84%; n=45) with mmolRC grade 1 shortness of breath had no symptoms of depression. As the grade of mmolRC increase, the severity of depressive symptoms as per HAMD scale also increased. About 42.86% (n=9) of the patients having mmolRC grade 3 shortness of breath had moderate to severe depressive symptoms (table 17/fig. 13).

Table 17: Association of depressive symptoms with mMRC dyspnoea scale (n=100)

MMRC dyspnoea scale	HAM-D			
	Not present	Mild	Mild to moderate	Moderate to severe
1	45	3	1	0
	91.84%	6.12%	2.04%	0.00%
2	19	1	7	3
	63.33%	3.33%	23.33%	10.00%
3	5	1	6	9
	23.81%	4.76%	28.57%	42.86%

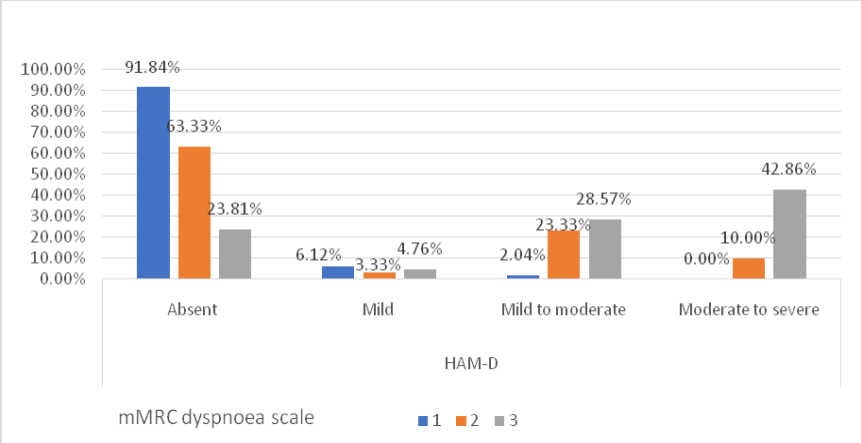

Fig. 13: Association of depressive symptoms with mMRC dyspnoea scale (n=100)

Association of depressive symptoms with gold staging

As per our observation, majority patients (89.80%; n=44) with GOLD Staging A had no symptoms of depression. As the GOLD staging increased, the severity of depressive symptoms as per HAMD scale also increased. About 70% (n=7) of the patients having GOLD stage D had moderate to severe depressive symptoms (table 18/fig. 14).

Table 18: Association of depressive symptoms with gold staging (n=100)

Gold staging	HAM-D			
	Not present	Mild	Mild to moderate	Moderate to severe
A	44	3	2	0
	89.80%	6.12%	4.08%	0.00%
B	19	0	5	3
	70.37%	0.00%	18.52%	11.11%
C	4	1	7	2
	28.57%	7.14%	50.00%	14.29%
D	2	1	0	7
	20.00%	10.00%	0.00%	70.00%

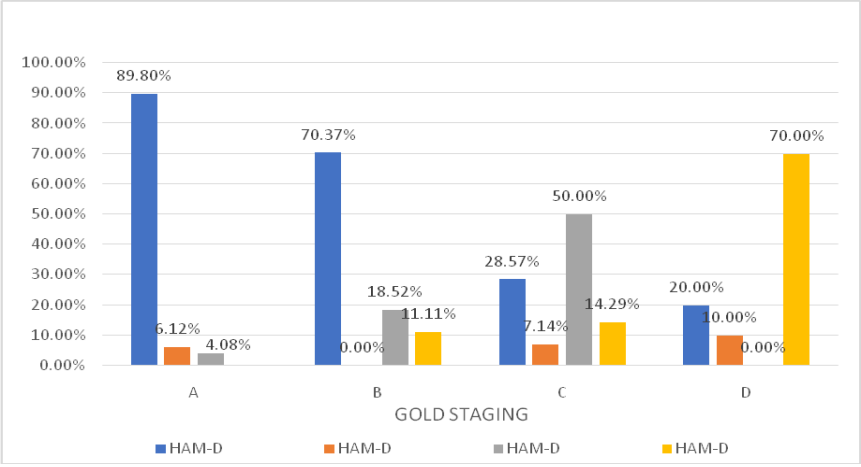

Fig. 14: Association of depressive symptoms with gold staging (n=100)

Association of depressive symptoms with duration of COPD

As per our observation, majority patients (87.88%; n=29) with COPD duration less than 5 y had no symptoms of depression. As the duration of COPD increased, the severity of depressive symptoms as per HAM-D scale also increased. About 30.77%(n=4) patients having duration of COPD more than 15 y had moderate to severe depressive symptoms (table 19/fig. 15).

Table 19: Association of depressive symptoms with duration of COPD (n=100)

COPD duration	HAM-D			
	Absent	Mild	Mild to moderate	Moderate to severe
<5 y	29	2	1	1
	87.88%	6.06%	3.03%	3.03%
5-10 y	23	0	4	4
	74.19%	0.00%	12.90%	12.90%
10-15 y	11	2	7	3
	47.83%	8.70%	30.43%	13.04%
>15 y	6	1	2	4
	46.15%	7.69%	15.38%	30.77%

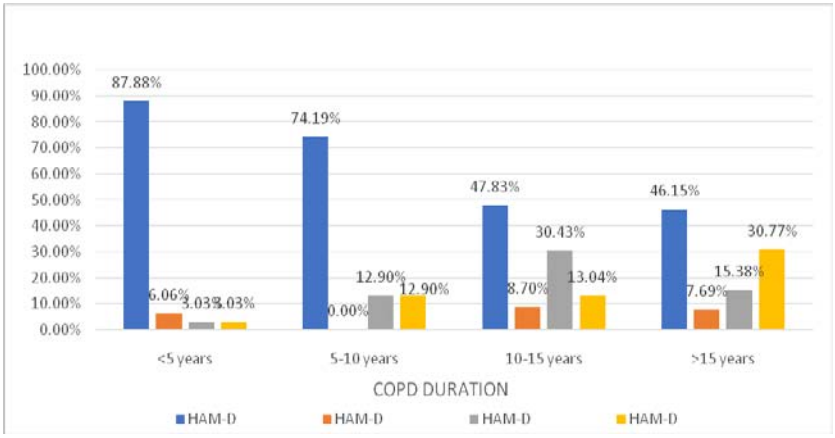

Fig. 15: Association of depressive symptoms with duration of COPD (n=100)

Table 20: Association of depressive symptoms with spirometric staging (n=100)

Spirometric staging	HAM-D			
	Not present	Mild	Mild to moderate	Moderate to severe
MILD	37	2	2	0
	90.24%	4.88%	4.88%	0.00%
MODERATE	28	1	6	7
	66.67%	2.38%	14.29%	16.67%
SEVERE	4	2	4	4
	28.57%	14.29%	28.57%	28.57%
VERY SEVERE	0	0	2	1
	0.00%	0.00%	66.67%	33.33%

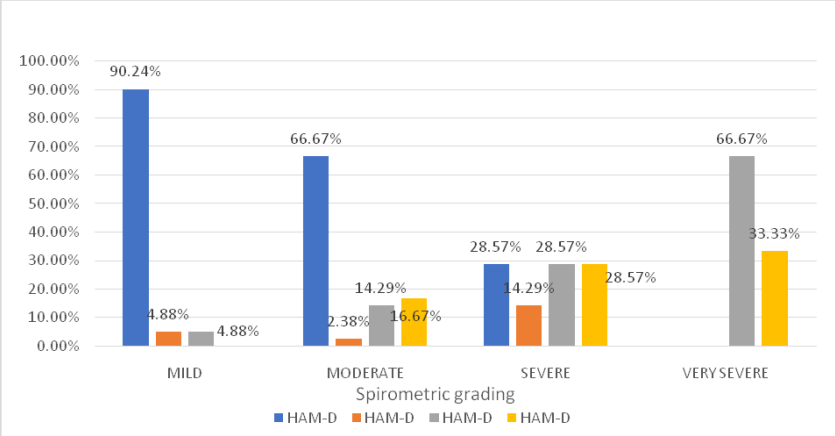

Fig. 16: Association of depressive symptoms with spirometric staging (n=100)

Association of depressive symptoms with spirometric staging

As per our observation, majority patients (n=37;90.24%) with mild obstruction had no symptoms of depression. As the severity of obstruction increased, the severity of depressive symptoms as per HAMD scale also increased (table 20/fig. 16).

DISCUSSION

Chronic obstructive pulmonary disease (COPD) is 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 and gases. The global burden of disease study found that COPD is an important contributor to disability and mortality worldwide. COPD is now one of the top three causes of death worldwide and 90% of these deaths occur in low- and middle-income countries (LMICs). Globally, the COPD burden is projected to increase in coming decades because of continued exposure to COPD risk factors and aging of the population [11]. The prevalence of COPD worldwide is estimated to be 7-19%. The Burden of Obstructive Lung Disease (BOLD) study found a global prevalence of 10.1% [12]. Men were found to have a pooled prevalence of 11.8% and women 8.5%. These reports are widely believed to be underestimates because COPD is known to be underdiagnosed and undertreated. Additionally, the prevalence in women is believed to be increasing.

COPD often coexists with other diseases (comorbidities) that have a significant impact on disease course. High rates of cardiovascular diseases, diabetes, and mood disorders (e. g., anxiety and depression) are reported in COPD patients [13, 14]. These comorbidities are reported to increase the risk of mortality and hospitalizations in COPD patients [15, 16] and they exponentially increase the costs of treatment [17].

This study was conducted in the Department of Psychiatry at Indira Gandhi Medical College Shimla, Himachal Pradesh to estimate the prevalence of co-morbidities in stable patients of COPD and to co-relate the nature of co-morbidities with relevant variables of COPD. The study was a hospital-based cross-sectional study. The study population included stable COPD patients who attended the Pulmonary Medicine outpatient clinic of IGMC. The patients were evaluated for psychiatric comorbidities in the Psychiatry department. We excluded patients who were already taking medication for any psychiatric illness, who presented with acute exacerbation and those who were suffering from any chronic illness other than COPD. History, general examination and relevant investigations were done initially. Patients were assessed for the presence of psychiatric co-morbidities.

In our study population, most of the patients (73%) were male and 27% were females. Several previous studies also revealed male predominance [18, 19].

In our study population, majority (87%) of the population were between 40-80 y of age. Mean value of age observed was 64.25+10.32 and median age was 63. This is in concordance with previous studies [19, 20].

Most of the cases (70%) were from a rural background which is almost similar to study by Ahmed *et al.* [21] which had 61.3% of patients from rural background. However, Corpa *et al.* [22] conducted a study that consisted mostly of patients from an urban background. The higher representation of the rural population in this study may be because a substantial number of patients are referred from peripheral health institutes of our state to this tertiary care centre. Another reason for large number of rural patients could be due to the distribution of the human population in the state of Himachal Pradesh where more than 90% of the population lives in villages (Census 2011).

Among the study population, about two-thirds (65%) of the patients were married and 30% were widowed while 5% patients had been separated from their spouses. This reflected the values of previous studies [18, 21].

About three-fourths (72%) of the patients were ex-smokers, 18% were current smokers, while 10% of the patients had never smoked. In the study conducted by Shyam *et al.* [18], 55.40 % were ex-smokers while 16.21% were current smokers and 28.38 % had never smoked.

About two-thirds (62%) of the patients were found to have psychiatric co-morbidities. The most common psychiatric co-morbidity was found to be mixed anxiety and depression in 20% of the patients followed by an unspecified anxiety disorder in 12% of the patients,9% of the patients were diagnosed with dementia while 6% were found to have a major depressive disorder. Varying prevalence rates of psychiatric co-morbidities in COPD have been reported from various parts of the world, ranging from 5% to more than 40% [23-25]. In the study by Shyam *et al.* [18], cases had psychiatric comorbidity of 28.4% as compared to 2.7% in controls (P = 0.005). In an Indian study conducted by Sharma *et al.* [26], the prevalence of psychiatric comorbidity was estimated to be around 44.8% as compared to 24.3% in controls.

As per our observation, about one-third (37%) of the patients had the presence of diagnosable anxiety spectrum disorder. The study by Kahraman *et al.* [27] found that the prevalence of anxiety in COPD patients was 30.7% as compared to 16.4% in controls. In the study by Sharma *et al.*, the prevalence of anxiety disorders was 20.6% [26]. As per many other studies prevalence of anxiety in stable COPD ranges from 7% to 50% [28, 29]. This compares with our findings and consolidates the fact that the prevalence of anxiety disorders is significantly higher in stable COPD patients.

About one-fourth of the patients (26%) in our study had the presence of diagnosable depressive disorder. In the study by Shyam *et al.*, the frequency of clinically significant depression was 8.1% in cases as compared to 0% in controls [18]. The prevalence of depression as observed by Sharma *et al.* was 13.2% [26]. However, studies from other countries reported the prevalence of depression in patients with COPD varying from 6% to 56% [30-32]. The study by Negi *et al.* found a prevalence of depression of 33% [33]. There is no standardized approach for the diagnosis of depression in COPD patients because of the differences in the methodology and variability of the screening questionnaires in cut-off points to determine a diagnosis of depression. Hence, the wide range that is observed among different studies. Maurer *et al.* also found a prevalence of depression in COPD patients to vary from 10% to 42% [14]. The differences were attributed to the differences in sampling and variability in diagnostic instruments and cut-off score.

As per our observations,23% of the patients had the presence of cognitive decline as per ACE-III scale. Various controlled studies have investigated the prevalence of cognitive impairment in COPD, [34-36], showing that prevalence to be higher in COPD patients than in healthy control subjects. According to such studies, mild cognitive impairment is present in 36% of COPD patients and in 12% of subjects without COPD. In a study conducted by Raffaelle *et al.*, [36] the prevalence of cognitive impairment and severe cognitive impairment in COPD patients was found to be 32.8% and 10.4%, respectively. In our study, the prevalence of mild cognitive impairment was found to be 15% while the prevalence of severe cognitive impairment was found to be 7%.

Females had more prevalence of anxiety symptoms as compared to males. More than two-thirds (77.77%) of the females in the study population were diagnosed with anxiety spectrum disorders as compared to males which had a prevalence of 38.35%. Also, females had more severity of anxiety symptoms as per the HARS scale as compared to males. However, there was no significant difference in the prevalence of depressive symptoms among male and female patients.33% of females and 30% of males had the presence of depressive symptoms**.** This finding goes in concordance with the study by Laurin *et al.* [37] in which the prevalence was 1.5 times more common in women as compared to men in cases. In the study by Shyam *et al.* [18], gender was not associated with the prevalence of depression in COPD patients Di Marco *et al.* [38] reported in their study that female patients had higher levels of both anxiety and depression and worse symptom-related quality of life. Female patients appeared to be more exposed to psychological impairment, which correlates well with some specific symptomatic aspects of the disease, such as dyspnoea.

As per our observation, the severity of anxiety and depressive symptoms as per the HARS scale and HAMD scales, respectively, increased as the severity of the disease increased. About 42% of the patients having mmolRC grade 3 shortness of breath had moderate to severe anxiety and depressive symptoms. As the GOLD staging increased the severity of anxiety and depressive symptoms also increased. About half (50%) of the patients and about two-thirds (70%) of the patients having GOLD stage D had severe anxiety and moderate to severe depressive symptoms, respectively. The longer duration of COPD symptoms was associated with more severe depressive symptoms. However, the association of severity of anxiety with duration of COPD was not found to be significant. The severity of anxiety and depressive symptoms was also found to increase as the severity of obstruction as per spirometric grading increased. In the study by Shyam *et al.* [18], the frequency of psychiatric comorbidities increased with the severity of COPD. In this study, there was a significant difference in the frequency of psychiatric comorbidities with durations of symptoms of COPD. The frequency of psychiatric comorbidities in cases with a duration of symptoms of more than 10 y was nearly 67%. Another study did not find differences in the proportions of patients with clinically relevant symptoms of anxiety and/or depression between GOLD Groups A to D [39] A study from India concluded that as spirometric severity of COPD increases, score on PHQ-9 (that evaluate the severity of depressive symptoms) also increases [40]. However, in a study by Dua *et al.*, no significant association was found between spirometric severity and severity of anxiety and depressive symptoms [41].

LIMITATIONS OF THE STUDY

The study was conducted for a period of one year and regular follow up of patients after treatment of psychiatric co-morbidities could not be done due to lack of time and resources. Thus, the impact of interventions and treatment of psychiatric co-morbidities on COPD could not be assessed.

Majority of the patients in our study belonged to lower socioeconomic status which could be an independent risk factor for developing psychiatric illnesses.

Another multicentre large observational study can be planned in the future to overcome the above problems.

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Nil

AUTHORS CONTRIBUTIONS

All authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

REFERENCES

1. Halpin DMG, Celli BR, Criner GJ, Frith P, Lopez Varela MV, Salvi S. The GOLD summit on chronic obstructive pulmonary disease in low-and middle-income countries. Int J Tuberc Lung Dis. 2019 Nov 1;23(11):1131-41. doi: 10.5588/ijtld.19.0397, PMID 31718748.
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 J Chronic Obstruct Pulm Dis. 2013 Jun 1;10(3):324-32. doi: 10.3109/15412555.2012.744963, PMID 23713595.
2. Divo M, Cote C, de Torres JP, Casanova C, Marin JM, Pinto Plata V. Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 2012 Jul 15;186(2):155-61. doi: 10.1164/rccm.201201-0034OC, PMID 22561964.
3. Charlson M, Charlson RE, Briggs W, Hollenberg J. Can disease management target patients most likely to generate high costs? The impact of comorbidity. J Gen Intern Med. 2007 Apr 1;22(4):464-9. doi: 10.1007/s11606-007-0130-7, PMID 17372794.
4. Shim TS, Lee JH, Kim SY, Lim TH, Kim SJ, Kim DS. Cerebral metabolic abnormalities in COPD patients detected by localized proton magnetic resonance spectroscopy. Chest. 2001 Nov 1;120(5):1506-13. doi: 10.1378/chest.120.5.1506, PMID 11713127.
5. Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E. The mini-international neuropsychiatric interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry. 1998 Jan 1;59(20)Suppl 20:22-34. PMID 9881538.
6. World Health Organization. The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines. World Health Organization; 1992.
7. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960;23(1):56-62. doi: 10.1136/jnnp.23.1.56, PMID 14399272.
8. Hamilton MA. The assessment of anxiety states by rating. Br J Med Psychol. 1959;32(1):50-5. doi: 10.1111/j.2044-8341.1959.tb00467.x, PMID 13638508.
9. Hodges JR, Larner AJ. Addenbrooke's cognitive examinations: ace, ace-r, ace-iii, ace app, and m-ace. In: Cognitive screening instruments; 2017. p. 109-37.
10. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLOS Med. 2006 Nov 28;3(11):e442. doi: 10.1371/journal.pmed.0030442, PMID 17132052.
11. Halbert RJ, Natoli JL, Gano A, Badamgarav E, Buist AS, Mannino DM. Global burden of COPD: systematic review and meta-analysis. Eur Respir J. 2006 Sep 1;28(3):523-32. doi: 10.1183/09031936.06.00124605, PMID 16611654.
12. Fabbri LM, Luppi F, Beghe B, Rabe KF. Complex chronic comorbidities of COPD. Eur Respir J. 2008 Jan 1;31(1):204-12. doi: 10.1183/09031936.00114307, PMID 18166598.
13. Maurer J, Rebbapragada V, Borson S, Goldstein R, Kunik ME, Yohannes AM. Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. Chest. 2008 Oct 1;134(4)Suppl:43S-56S. doi: 10.1378/chest.08-0342, PMID 18842932.
14. Mannino DM, Thorn D, Swensen A, Holguin F. Prevalence and outcomes of diabetes, hypertension and cardiovascular disease in COPD. Eur Respir J. 2008 Oct 1;32(4):962-9. doi: 10.1183/09031936.00012408, PMID 18579551.
15. Ng TP, Niti M, Tan WC, Cao Z, Ong KC, Eng P. Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life. Arch Intern Med. 2007 Jan 8;167(1):60-7. doi: 10.1001/archinte.167.1.60, PMID 17210879.
16. Charlson M, Charlson RE, Briggs W, Hollenberg J. Can disease management target patients most likely to generate high costs? The impact of comorbidity. J Gen Intern Med. 2007 Apr 1;22(4):464-9. doi: 10.1007/s11606-007-0130-7, PMID 17372794.
17. Chaudhary SC, Nanda S, Tripathi A, Sawlani KK, Gupta KK, Himanshu D. Prevalence of psychiatric comorbidities in chronic obstructive pulmonary disease patients. Lung India Off Organ Indian Chest Soc. 2016 Mar;33(2):174-8. doi: 10.4103/0970-2113.177441, PMID 27051106.
18. Rosinczuk J, Przyszlak M, Uchmanowicz I. Sociodemographic and clinical factors affecting the quality of life of patients with chronic obstructive pulmonary disease. Int J Chron Obstruct Pulmon Dis. 2018;13:2869-82. doi: 10.2147/COPD.S165714, PMID 30254434.
19. Suerdem M, Gunen H, Akyildiz L, Cilli A, Ozlu T, Uzaslan E. Demographic, clinical and management characteristics of newly diagnosed COPD patients in turkey: a real-life study. Int J Chron Obstruct Pulmon Dis. 2020;15:261-7. doi: 10.2147/COPD.S211838, PMID 32103925.
20. Ahmed MS, Neyaz A, Aslami AN. Health-related quality of life of chronic obstructive pulmonary disease patients: results from a community-based cross-sectional study in Aligarh, Uttar Pradesh, India. Lung India off Organ Indian Chest Soc. 2016 Mar;33(2):148-53. doi: 10.4103/0970-2113.177438, PMID 27051101.
21. Abad Corpa E, Royo Morales T, Iniesta Sanchez J, Rodriguez Mondejar JJ, Carrillo Alcaraz A, Perez Garcia MC. A descriptive study of the socio-demographic and clinical profile of the patient

with chronic obstructive pulmonary disease. Enferm Clin. 2011 Jan 1;21(1):12-8. doi: 10.1016/j.enfcli.2010.10.002, PMID 21333577.

22. Rossi Ferrario S, Cremona G. Communication in a medical setting: can standards be improved? Multidiscip Respir Med. 2013;8(1):1. doi: 10.1186/2049-6958-8-1, PMID 23295153.
23. Janssen DJ, Spruit MA, Leue C, Gijsen C, Hameleers H, Schols JM. Symptoms of anxiety and depression in COPD patients entering pulmonary rehabilitation. Chron Respir Dis. 2010 Aug;7(3):147-57. doi: 10.1177/1479972310369285, PMID 20688892.
24. Lou P, Zhu Y, Chen P, Zhang P, Yu J. 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 Pulm Med. 2012 Dec;12(1):1-9.
25. Sharma BB, Singh S, Sharma VK, Choudhary M, Singh V, Lane S. Psychiatric morbidity in chronic respiratory disorders in an Indian service using GMHAT/PC. Gen Hosp Psychiatry. 2013 Jan 1;35(1):39-44. doi: 10.1016/j.genhosppsych.2012.09.009, PMID 23122486.
26. Kahraman H, Orhan FO, Sucakli MH, Ozer A, Koksal N, Sen B. Temperament and character profiles of male COPD patients. J Thorac Dis. 2013;5(4):406-13. doi: 10.3978/j.issn.2072-1439.2013.07.11, PMID 23991295.
27. Hynninen KM, Breitve MH, Wiborg AB, Pallesen S, Nordhus IH. Psychological characteristics of patients with chronic obstructive pulmonary disease: a review. J Psychosom Res. 2005 Dec 1;59(6):429-43. doi: 10.1016/j.jpsychores.2005.04.007, PMID 16310027.
28. Yohannes AM, Alexopoulos GS. Depression and anxiety in patients with COPD. Eur Respir Rev. 2014 Sep 1;23(133):345-9. doi: 10.1183/09059180.00007813, PMID 25176970.
29. Fan VS, Ramsey SD, Giardino ND, Make BJ, Emery CF, Diaz PT. Sex, depression, and risk of hospitalization and mortality in chronic obstructive pulmonary disease. Arch Intern Med. 2007 Nov 26;167(21):2345-53. doi: 10.1001/archinte.167.21.2345, PMID 18039994.
30. Garrod R, Marshall J, Barley E, Jones PW. Predictors of success and failure in pulmonary rehabilitation. Eur Respir J. 2006 Apr 1;27(4):788-94. doi: 10.1183/09031936.06.00130605, PMID 16481381.
31. Cinciripini PM, Wetter DW, Fouladi RT, Blalock JA, Carter BL, Cinciripini LG. The effects of depressed mood on smoking cessation: mediation by postcessation self-efficacy. J Consult Clin Psychol. 2003 Apr;71(2):292-301. doi: 10.1037/0022-006x.71.2.292, PMID 12699023.
32. Negi H, Sarkar M, Raval AD, Pandey K, Das P. Health-related quality of life in patients with chronic obstructive pulmonary disease in North India. J Postgrad Med. 2014 Jan 1;60(1):7-11. doi: 10.4103/0022-3859.128797, PMID 24625932.
33. Dodd JW, Chung AW, van den Broek MD, Barrick TR, Charlton RA, Jones PW. Brain structure and function in chronic obstructive pulmonary disease: a multimodal cranial magnetic resonance imaging study. Am J Respir Crit Care Med. 2012 Aug 1;186(3):240-5. doi: 10.1164/rccm.201202-0355OC, PMID 22652026.
34. Thakur N, Blanc PD, Julian LJ, Yelin EH, Katz PP, Sidney S. COPD and cognitive impairment: the role of hypoxemia and oxygen therapy. Int J Chron Obstruct Pulmon Dis. 2010;5:263-9. doi: 10.2147/copd.s10684, PMID 20856825.
35. Antonelli Incalzi R, Corsonello A, Pedone C, Trojano L, Acanfora D, Spada A. Drawing impairment predicts mortality in severe COPD. Chest. 2006 Dec 1;130(6):1687-94. doi: 10.1378/chest.130.6.1687, PMID 17166983.
36. Laurin C, Lavoie KL, Bacon SL, Dupuis G, Lacoste G, Cartier A. Sex differences in the prevalence of psychiatric disorders and psychological distress in patients with COPD. Chest. 2007 Jul 1;132(1):148-55. doi: 10.1378/chest.07-0134, PMID 17505033.
37. Di Marco F, Verga M, Reggente M, Maria Casanova FM, Santus P, Blasi F. Anxiety and depression in COPD patients: the roles of gender and disease severity. Respir Med. 2006 Oct 1;100(10):1767-74. doi: 10.1016/j.rmed.2006.01.026, PMID 16531031.
38. Hilmarsen CW, Wilke S, Engan H, Spruit MA, Rodenburg J, Janssen DJ. Impact of symptoms of anxiety and depression on COPD assessment test scores. Eur Respir J. 2014 Mar 1;43(3):898-900. doi: 10.1183/09031936.00163913, PMID 24114965.
39. De S. Prevalence of depression in stable chronic obstructive pulmonary disease. Indian J Chest Dis Allied Sci. 2011 Jan 1;53(1):35-9. doi: 10.5005/ijcdas-53-1-35, PMID 21446223.
40. 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 off Organ Indian Chest Soc. 2018 Jan;35(1):31-6. doi: 10.4103/lungindia.lungindia_537_16, PMID 29319031.