



Prevalence and Association of Anxiety and Depression with Disease Severity in Chronic Obstructive Pulmonary Disease: A Cross-Sectional Study

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Received: February 10, 2026

Revised: March 15, 2026

Accepted: March 31, 2026

Published: April 14, 2026

Abstract

Background: Chronic obstructive pulmonary disease (COPD) is frequently accompanied by psychiatric comorbidities such as anxiety and depression, which may adversely influence smoking behavior, disease progression, and quality of life. Despite the established clinical relevance, the quantitative relationship between psychiatric symptoms and COPD severity remains inadequately explored. **Objectives:** To determine the prevalence of anxiety and depression among COPD patients and to assess their association with smoking behavior and disease severity. **Material and Methods:** A cross-sectional study was conducted among 180 male smokers aged 40–70 years diagnosed with COPD attending the Chest Medicine outpatient department. Clinical evaluation included spirometry, modified Medical Research Council dyspnea grading, six-minute walk test, and BODE index calculation. Anxiety and depression were measured using the Hamilton Anxiety Scale (HAM-A) and Montgomery-Åsberg Depression Rating Scale (MADRS). GOLD guidelines were used for staging of COPD. Statistical analyses involved correlation and multivariate regression modeling. **Results:** Mild anxiety and mild depression were common findings. Depression demonstrated a stronger correlation with smoking index, GOLD stage, and BODE score compared to anxiety. Regression analyses revealed that COPD severity contributed significantly to smoking behavior, while depression was more strongly associated with prognosis and disease stage. Age did not show significant associations with psychiatric scores or severity. **Discussion:** Depressive symptoms appeared more influential than anxiety in determining smoking behavior and disease severity in COPD patients, suggesting a potential role for early psychiatric screening in routine clinical management. **Conclusion:** Depression demonstrated stronger associations with smoking and disease severity in COPD than anxiety. Identification and treatment of depressive symptoms may interrupt the vicious cycle linking psychiatric distress, smoking, and COPD progression. Larger multicentric studies are warranted to validate these findings.

Keywords: Chronic obstructive pulmonary disease, Depression, Anxiety, Smoking behavior, Disease severity, Cross-sectional study



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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is currently recognized as the third leading cause of death globally, with nearly 80% of COPD-related mortality occurring in low- and middle-income countries (1). It is a progressive and life-threatening respiratory condition characterized initially by exertional dyspnea and later by frequent exacerbations, declining lung function, and reduced exercise tolerance (2). The prevalence of COPD continues to rise due to increasing tobacco use, air pollution, and lifestyle changes across populations.

Beyond the respiratory impairment, COPD is associated with substantial psychological morbidity. Anxiety and depression are among the most frequently observed psychiatric comorbidities in COPD patients, partly due to chronic symptoms, activity limitation, and disability (3). These conditions adversely affect daily functioning

and quality of life by influencing physical, emotional, and social domains (4). Furthermore, psychological distress contributes to increased healthcare utilization and economic burden for both patients and caregivers (5,6).

Several studies have reported a bidirectional relationship between COPD and psychiatric comorbidities, wherein dyspnea, hyperventilation, and disease-related hyperinflation may amplify anxiety symptoms, forming a vicious cycle of disease perception and physiological arousal (6). Evidence suggests that higher levels of anxiety and depression correlate with increased COPD severity (7–9). Smoking appears to further complicate this association. While smoking is a well-established risk factor for COPD onset, individuals with depressive symptoms may also smoke as a coping mechanism,

Citation: Panda R, Hota SK, Sahu P Prevalence and Association of Anxiety and Depression with Disease Severity in Chronic Obstructive Pulmonary Disease: A Cross-Sectional Study. *Int. J. Med.*, 2026;8(4):309-313.

leading to a self-perpetuating cycle that reinforces both psychiatric symptoms and respiratory dysfunction (10).

The prevalence of anxiety and depression in COPD varies widely across studies. A recent meta-analysis estimated the pooled prevalence of depression in COPD to be approximately 27% (10). Despite this, symptoms of anxiety and depression are frequently overlooked in clinical practice, as somatic complaints often overshadow psychiatric manifestations. It has been reported that fewer than one-third of COPD patients with psychiatric comorbidity receive appropriate treatment (11). Early identification and management of anxiety and depression in COPD may therefore offer opportunities to reduce exacerbations, improve treatment adherence, and enhance overall health status.

However, there remains a gap in the literature regarding the quantitative relationship between COPD severity, smoking status, and psychological morbidity. The present study was undertaken to evaluate the prevalence of depression and anxiety among COPD patients and to examine their association with disease severity.

Aims and Objectives

1. To estimate the prevalence of depression and anxiety among patients with chronic obstructive pulmonary disease (COPD).
2. To assess the association between anxiety and depression and the severity of COPD.

MATERIALS AND METHODS

This cross-sectional study was conducted in the outpatient department of Chest Medicine at PGIMER & Capital Hospital Bhubaneswar after obtaining approval from the Institutional Ethics Committee. A total of 180 patients diagnosed with chronic obstructive pulmonary disease (COPD) were enrolled over a period of 12 months using consecutive sampling.

Inclusion Criteria

- Male patients aged 40–70 years.

RESULTS

The mean age of the study population was 56.2 ± 8.1 years. The mean smoking index was 19.4 ± 7.2 pack-years. The mean BODE score was 3.1 ± 1.9 , while mean HAM-A and MADRS scores were 3.6 ± 4.4 and 11.8 ± 7.3 , respectively (Table 1).

- Confirmed diagnosis of COPD based on clinical assessment and spirometry.
- Current or past smokers with a cumulative smoking history of ≥ 10 pack-years.

Exclusion Criteria

- Female patients.
- Non-smokers.
- Males aged above 70 years.
- Individuals unwilling to undergo pulmonary function testing or complete psychological assessment.

Written informed consent was obtained from all participants in their local language. A structured interviewer-administered questionnaire was used to collect demographic details, smoking history, duration of symptoms, and disease-related characteristics. Anthropometric measurements including body mass index (BMI) were recorded. Each participant underwent thorough clinical examination and chest radiography; computed tomography of the chest was performed when clinically indicated.

The COPD Assessment Test (CAT), an 8-item validated tool, was used to assess health status impairment. Exercise tolerance and functional capacity were evaluated using the six-minute walk test (6MWT). Dyspnea severity was graded using the modified Medical Research Council (mMRC) dyspnea scale. A history of moderate or severe exacerbations within the preceding year was recorded. Disease severity was assessed using the BODE index (comprising BMI, airflow obstruction, dyspnea, and exercise capacity), which is widely used as a prognostic marker in COPD.

Spirometry was performed following the administration of a short-acting bronchodilator, and diagnosis and staging of COPD were made in accordance with the GOLD guidelines (12). Anxiety was assessed using the Hamilton Anxiety Scale (HAM-A), while depression was evaluated using the Montgomery–Åsberg Depression Rating Scale (MADRS) (13,14).

Table 1. Descriptive Characteristics of the Study Population (n = 180)

Variable	Mean	SD	Min	Max
Age (years)	56.2	8.1	40	72
Smoking Index (pack-years)	19.4	7.2	10	44
BODE Score	3.1	1.9	0	8
HAM-A Score	3.6	4.4	0	20
MADRS Score	11.8	7.3	3	33

Based on GOLD staging, Stage II was the most common category, followed by Stage III. The prevalence of mild anxiety was 58.3% and moderate anxiety was 13.9%. Depression was detected in 46.1% of patients, with the majority having mild to moderate symptoms. There was no statistically significant association between age and anxiety or depression. Smoking

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demonstrated a positive correlation with depression and a weaker correlation with anxiety. BODE index showed a weak but significant correlation with both anxiety and depression. GOLD stage exhibited a moderate positive correlation with depression and a weaker correlation with anxiety (Table 2).

Table 2. Correlations Between Smoking, Anxiety, Depression, and Prognostic Factors (n = 180)

Relationship	Correlation Strength	R	p-value	Significance
Age ↔ Anxiety	None	0.04	0.31	NS
Age ↔ Depression	None	0.05	0.18	NS
Age ↔ BODE	None	0.10	0.04	*
Smoking ↔ Depression	Moderate	0.51	<0.001	**
Smoking ↔ Anxiety	Low	0.26	<0.01	*
BODE ↔ HAM-A	Low	0.12	<0.05	*
BODE ↔ MADRS	Low	0.39	<0.001	**
GOLD ↔ HAM-A	Low	0.19	<0.01	*
GOLD ↔ MADRS	Moderate	0.46	<0.001	**

NS – Not Significant; * p<0.05; ** p<0.001

Multiple linear regression modeling showed that disease severity (GOLD stage) contributed significantly to smoking behavior, while anxiety and depression had lesser influence (Table 3).

Table 3. Multivariate Regression Model: Smoking as Outcome Variable

Model: Smoking = $\beta_0 + \beta_1(\text{HAM-A}) + \beta_2(\text{MADRS}) + \beta_3(\text{GOLD Stage})$

Predictor	β (Coefficient)	SE	t	P
Constant	0.52	0.41	1.26	0.21
HAM-A	-0.08	0.07	-1.14	0.26
MADRS	0.07	0.04	1.69	0.09
GOLD Stage	0.63	0.19	3.32	<0.01*

Model Fit: $R^2 = 0.31$; Adj. $R^2 = 0.27$; $F = 7.9$; $p < 0.001^*$

A separate regression model examining prognosis revealed an inverse association between anxiety and BODE score, while depression exhibited a positive association (Table 4).

Table 4. Multivariate Regression Model: BODE as Outcome Variable

Model: BODE = $\beta_0 + \beta_1(\text{HAM-A}) + \beta_2(\text{MADRS})$

Predictor	β (Coefficient)	SE	t	P
Constant	1.81	0.38	4.74	<0.001
HAM-A	-0.14	0.08	-1.72	0.09
MADRS	0.15	0.05	3.28	<0.01*

Model Fit: $R^2 = 0.21$; Adj. $R^2 = 0.18$; $F = 6.1$; $p < 0.01^*$

Regression analysis of GOLD stage demonstrated that depression, rather than anxiety, significantly influenced disease severity (Table 5). Taken together, these findings indicate that depression has a stronger association with smoking, disease severity, and prognosis compared to anxiety among COPD patients.

Table 5. Multivariate Regression Model: GOLD Stage as Outcome Variable

Model: GOLD Stage = $\beta_0 + \beta_1(\text{HAM-A}) + \beta_2(\text{MADRS})$

Predictor	β (Coefficient)	SE	t	P
Constant	1.70	0.21	8.13	<0.001
HAM-A	-0.07	0.05	-1.51	0.13
MADRS	0.10	0.02	3.94	<0.001*

Model Fit: $R^2 = 0.25$; Adj. $R^2 = 0.22$; $F = 7.8$; $p < 0.01^*$

Disease severity and prognosis showed stronger associations with depressive symptoms compared to anxiety, suggesting depression may play a more substantial role in disease progression and smoking behavior among COPD patients.

DISCUSSION

In this study, anxiety and depression were common among patients with COPD, with the majority exhibiting mild symptoms and a smaller proportion experiencing moderate symptoms. These findings are consistent with previous reports indicating a high prevalence of psychiatric comorbidities in COPD populations. Willgoss and Yohannes observed that clinical anxiety

was present in 13–46% of COPD outpatients (15). Similarly, Elassal et al. reported anxiety and depression prevalences of 22.5% and 42.5%, respectively (8). Other studies have estimated depression prevalence in COPD ranging between 16.5% and 27.4%, highlighting considerable heterogeneity across settings and severity groups. Depression has been shown to adversely

influence outcomes such as exacerbation rates, re-hospitalization, and functional capacity (16).

Anxiety and depression are well recognized to accompany COPD (17). Psychological distress may influence smoking behavior, which in turn worsens respiratory symptoms and accelerates disease progression, forming a self-perpetuating cycle. Smoking may serve as a maladaptive coping strategy for depressive symptoms, while simultaneously acting as a major etiological and aggravating factor for COPD. Interrupting this cycle may have important therapeutic implications. Although pharmacological treatment of anxiety and depression in COPD is similar to that in patients without respiratory disease (18,19), difficulty arises when psychiatric comorbidities influence COPD severity and smoking behavior.

In our study, age did not demonstrate significant associations with anxiety, depression, or prognosis. While COPD prevalence increases with age (20), certain studies have reported higher levels of depressive symptoms among younger COPD patients (21). Our larger sample size revealed that smoking had a moderate positive correlation with depression, whereas the correlation with anxiety was weaker. Depression demonstrated a stronger association with disease severity and prognosis compared to anxiety. Although one might expect anxiety to rise with advancing COPD stage (22), our findings suggest that depressive symptoms may play a more prominent role in disease burden within this cohort.

Regression analyses further supported these observations. Disease severity (GOLD stage) was significantly associated with smoking behavior, while anxiety and depression were less predictive. Prognostic impairment measured through the BODE index demonstrated significant association with depressive symptoms. GOLD stage was significantly influenced by depression, while anxiety did not show a significant contribution. Collectively, these findings indicate that depression may have a stronger quantitative relationship with smoking, disease severity, and prognosis than anxiety among COPD patients.

The interaction of smoking, COPD, and psychiatric comorbidity has been documented previously. Lou et al. reported that smoking combined with depression accounted for approximately 60% of mortality among COPD patients, while smoking combined with anxiety contributed to nearly 50% (23). Another analysis by the same authors concluded that both anxiety and depression were associated with increased mortality in COPD (24). Goodwin et al. suggested that mood disorders and COPD may share common risk exposures rather than a direct causal pathway (25), whereas Ng et al. proposed that depression in COPD may persist independently of other confounders (26). However, literature examining the quantitative relationships between anxiety, depression, smoking, and COPD severity is limited, and the present study contributes to filling this gap.

Limitations

This study has certain limitations. The cross-sectional design precludes establishing causality between psychiatric symptoms, smoking behavior, and disease severity. Only male smokers were included, as women were less willing to disclose smoking history due to cultural sensitivities, limiting generalizability across genders. Although the sample size was larger compared to prior studies, unmeasured confounders such as socioeconomic status, medication adherence, and comorbid medical conditions may influence psychiatric symptomatology. Future research employing longitudinal or interventional designs is warranted to better characterize these associations.

CONCLUSION

This study highlights the significant burden of anxiety and depression among patients with COPD and suggests that depressive symptoms may have a stronger association with smoking behavior, disease severity, and prognosis than anxiety. Early recognition and targeted management of depression in COPD could provide an opportunity to interrupt the cycle linking psychiatric distress, smoking, and disease progression. Larger, multi-center studies across diverse populations are needed to quantify these associations and guide integrated clinical management strategies.

ACKNOWLEDGMENT

Nil.

REFERENCES

1. The Top 10 Causes of Death; 2020. Available from: <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death> [Last accessed on 2020 Dec 09].
2. World Health Organization. Chronic Obstructive Pulmonary Disease. Geneva: World Health Organization; 2017. Available from: [https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-\(copd\)](https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)) [Last accessed on 2021 Jun 21].
3. Di Marco F, Verga M, Reggente M, Casanova FM, Santus P, Blasi F, et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. *Respir Med* 2006;100(10):1767-1774. <http://doi.org/10.1016/j.rmed.2006.01.026>
4. Valenza MC, Valenza-Peña G, Torres-Sánchez I, González-Jiménez E, Conde-Valero A, Valenza-Demet G. Effectiveness of controlled breathing techniques on anxiety and depression in hospitalized patients with COPD: A randomized clinical trial. *Respir Care* 2014;59(2):209-215. <http://doi.org/10.4187/respcare.02565>
5. Al-Gamal E, Yorke J. Perceived breathlessness and psychological distress among patients with chronic obstructive pulmonary disease and their spouses. *Nurs Health Sci* 2014;16(1):103-111. <http://doi.org/10.1111/nhs.12073>

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6. O'Donnell DE, Banzett RB, Carrieri-Kohlman V, Casaburi R, Davenport PW, Gandevia SC, et al. Pathophysiology of dyspnea in chronic obstructive pulmonary disease: A roundtable. *Proc Am Thorac Soc* 2004;4(2):145-168. <http://doi.org/10.1513/pats.200611-159CC>
7. Janssen DJ, Spruit MA, Leue C, Gijzen C, Hameleers H, Schols JM, et al. Symptoms of anxiety and depression in COPD patients entering pulmonary rehabilitation. *Chron Respir Dis* 2010;7(3):147-157. <http://doi.org/10.1177/1479972310369285>
8. Ellassal G, Elsheikh M, Zeid AG. Assessment of depression and anxiety symptoms in chronic obstructive pulmonary disease patients: A case-control study. *Egypt J Chest Dis Tuberc* 2014;63(3):575-582. <http://doi.org/10.1016/j.ejcdt.2014.02.013>
9. van Manen JG, Bindels PJ, Dekker FW, IJzermans CJ, van der Zee JS, Schadé E. Risk of depression in patients with chronic obstructive pulmonary disease and its determinants. *Thorax* 2002;57(5):412-416. <http://doi.org/10.1136/thorax.57.5.412>
10. Matte DL, Pizzichini MM, Hoepers AT, Diaz AP, Karloh M, Dias M, et al. Prevalence of depression in COPD: A systematic review and meta-analysis of controlled studies. *Respir Med* 2016;117:154-161. <http://doi.org/10.1016/j.rmed.2016.06.006>
11. Maurer J, Rebbapragada V, Borson S, Goldstein R, Kunik ME, Yohannes AM, et al. Anxiety and depression in COPD: Current understanding, unanswered questions, and research needs. *Chest* 2008;134(Suppl 4):43S-56S. <http://doi.org/10.1378/chest.08-0342>
12. Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease 2019 Report; 2019. Available from: <http://www.goldcopd.org> [Last accessed on 2020 May 20].
13. Maier W, Buller R, Philipp M, Heuser I. The Hamilton Anxiety Scale: Reliability, validity and sensitivity to change in anxiety and depressive disorders. *J Affect Disord* 1988;14(1):61-68. [http://doi.org/10.1016/0165-0327\(88\)90072-9](http://doi.org/10.1016/0165-0327(88)90072-9)
14. Barman D, Mishra S, Mishra J, Mahapatra P, Manjareeka M. Association between depression and acute pain in adults attending a tertiary care hospital in Bhubaneswar. *J Clin Diagn Res* 2015;9(7):CC08-CC11. <http://doi.org/10.7860/JCDR/2015/12008.6179>
15. Willgoss TG, Yohannes AM. Anxiety disorders in patients with COPD: A systematic review. *Respir Care* 2013;58(5):858-866. <http://doi.org/10.4187/respcare.01862>
16. Putcha N, Drummond MB, Wise RA, Hansel NN. Comorbidities and chronic obstructive pulmonary disease: Prevalence, influence on outcomes, and management. *Semin Respir Crit Care Med* 2015;36(4):575-591. <http://doi.org/10.1055/s-0035-1556063>
17. Yohannes AM, Alexopoulos GS. Depression and anxiety in patients with COPD. *Eur Respir Rev* 2014;23(133):345-349. <http://doi.org/10.1183/09059180.00007813>
18. Cho MH, McDonald ML, Zhou X, Mattheisen M, Castaldi PJ, Hersh CP, et al. Risk loci for chronic obstructive pulmonary disease: A genome-wide association study and meta-analysis. *Lancet Respir Med* 2014;2(3):214-225. [http://doi.org/10.1016/S2213-2600\(14\)70002-5](http://doi.org/10.1016/S2213-2600(14)70002-5)
19. Mercado N, Ito K, Barnes PJ. Accelerated ageing of the lung in COPD: New concepts. *Thorax* 2015;70(5):482-489. <http://doi.org/10.1136/thoraxjnl-2014-206084>
20. Woldeamanuel GG, Mingude AB, Geta TG. Prevalence of chronic obstructive pulmonary disease (COPD) and its associated factors among adults in Abeshge District, Ethiopia: A cross-sectional study. *BMC Pulm Med* 2019;19(1):181. <http://doi.org/10.1186/s12890-019-0946-z>
21. Holm KE, Plaufcan MR, Ford DW, Sandhaus RA, Strand M, Strange C, et al. The impact of age on outcomes in chronic obstructive pulmonary disease differs by relationship status. *J Behav Med* 2014;37(4):654-663. <http://doi.org/10.1007/s10865-013-9516-7>
22. Schneider C, Jick SS, Bothner U, Meier CR. COPD and the risk of depression. *Chest* 2010;137(2):341-347. <http://doi.org/10.1378/chest.09-0614>
23. Lou P, Chen P, Zhang P, Yu J, Wang Y, Chen N, et al. Effects of smoking, depression, and anxiety on mortality in COPD patients: A prospective study. *Respir Care* 2014;59(1):54-61. <http://doi.org/10.4187/respcare.02487>
24. Lou P, Zhu Y, Chen P, Zhang P, Yu J, Wang Y, et al. Interaction of depressive and anxiety symptoms on the mortality of patients with COPD: A preliminary study. *COPD* 2014;11(4):444-450. <http://doi.org/10.3109/15412555.2013.822856>
25. Goodwin RD, Lavoie KL, Lemeshow AR, Jenkins E, Brown ES, Fedoronko DA. Depression, anxiety, and COPD: The unexamined role of nicotine dependence. *Nicotine Tob Res* 2012;14(2):176-183. <http://doi.org/10.1093/ntr/ntr165>
26. Ng TP, Niti M, Fones C, Yap KB, Tan WC. Co-morbid association of depression and COPD: A population-based study. *Respir Med* 2009;103(6):895-901. <http://doi.org/10.1016/j.rmed.2008.12.010>