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PSYCHOLOGICAL FACTORS AFFECTING THERAPY COMPLIANCE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A CROSS SECTIONAL ANALYSIS.

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Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) is a heterogeneous respiratory disorder associated with persistent airflow limitation, often complicated by psychological comorbidities like anxiety and depression. These mental health conditions are known to impair treatment adherence and worsen clinical outcomes.

Objective: To assess the prevalence of anxiety and depression among COPD patients and examine their impact on adherence to respiratory therapy and clinical outcomes.

Methods: A cross-sectional study was conducted over 1 year at the Department of Respiratory Medicine, Sree Balaji Medical College and Hospital, involving 100 COPD patients. The Hospital Anxiety and Depression Scale (HADS) was used to assess psychological distress, while adherence was evaluated using the Morisky Medication Adherence Scale-8 (MMAS-8). Clinical and demographic data were collected alongside spirometry, GOLD classification, and COPD Assessment Test (CAT) scores.

Results: Anxiety and depression were present in 48.5% and 41.2% of patients, respectively. A significant negative correlation was found between HADS scores and MMAS-8 adherence levels (p < 0.001). Patients with abnormal HADS scores exhibited significantly lower adherence. Most participants were male (79.4%) and aged 61–70 years (45.1%). Nearly 96.1% reported shortness of breath, with 46.1% classified in GOLD stage 3 and 30.4% in GOLD stage 4. CAT scores showed a high symptom burden in 45.1% of patients.

Conclusion: Psychological distress is prevalent among COPD patients and significantly impairs adherence to respiratory therapy. Routine screening and integration of mental health support into COPD management are essential for optimizing outcomes.

Keywords: COPD, anxiety, depression, adherence, MMAS-8, HADS, respiratory therapy

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) has traditionally been defined by spirometric indices and the progressive nature of airflow obstruction. However, recent insights, particularly from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), now define COPD as "a heterogeneous lung condition characterized by

chronic respiratory symptoms (dyspnea, cough, expectoration, exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction."[1] This nuanced understanding emphasizes the heterogeneity of COPD and acknowledges a wide range of etiotypes beyond smoking, such as early-life lung development issues, asthma-COPD overlap, biomass exposure, and genetic conditions like alpha-1 antitrypsin deficiency[1,2].

Globally, COPD remains a leading cause of morbidity and mortality, with increasing prevalence driven by aging populations, urbanization, and exposure to environmental pollutants[3]. It presents with hallmark symptoms such as breathlessness, chronic cough, and sputum production. However, the disease burden extends beyond somatic symptoms. Psychological disorders, notably anxiety and depression, are increasingly recognized as critical contributors to poor prognosis and diminished quality of life in COPD[4].

Meta-analyses have reported anxiety prevalence in COPD patients ranging from 10% to 50% and depression from 20% to 60%[5]. These psychological disorders complicate disease management by interfering with patients' ability to adhere to essential respiratory therapies, including inhaler use, nebulization, oxygen therapy, and participation in pulmonary rehabilitation[6,7]. Poor adherence is associated with frequent exacerbations, hospital admissions, and increased mortality[8].

Although the role of physical comorbidities in COPD has been extensively studied, the psychological dimensions—particularly their influence on therapy adherence—have not received equivalent attention in routine clinical care. Depression and anxiety symptoms often mimic COPD symptoms (e.g., fatigue, breathlessness), making them difficult to identify and manage without structured screening[9].

This study aims to address this gap by evaluating the prevalence of anxiety and depression in COPD patients and analyzing their effect on adherence to respiratory therapy and clinical outcomes.

Aim and Objectives
Aim:
To estimate the burden of anxiety and depression in COPD and examine their association with adherence to respiratory therapy and patient outcomes.

Objectives:
- To **determine the prevalence of anxiety and depression in COPD patients** and analyze their association with disease severity (GOLD and MMRC classifications).
- To **evaluate the impact of psychological comorbidities** on treatment adherence (MMAS-8) and quality of life (CAT).
- To **identify factors contributing to non-adherence** and recommend strategies for integrating mental health screening into routine COPD management.

MATERIALS AND METHODS

Study Design and Setting
A cross-sectional observational study was conducted over a 1 year period at the at the Department of Respiratory Medicine, Sree Balaji Medical College and Hospital.

Sample Size
A total of 100 patients diagnosed with COPD were enrolled, providing adequate statistical power for analysis.

Inclusion Criteria
- Confirmed diagnosis of moderate to severe COPD (GOLD Stage II–IV)
- Age ≥ 45 years
- Clinically stable (no exacerbations in the last 4 weeks)

Exclusion Criteria
- Cognitive impairments
- Severe psychiatric comorbidity
- Inability to provide informed consent

Tools and Instruments used for data collection
- **HADS**: A 14-item scale for screening anxiety (HADS-A) and depression (HADS-D).
- **MMAS-8**: Assesses medication adherence through 8 structured questions.
- **CAT**: Evaluates COPD-related symptom burden and quality of life.
- **Spirometry**: Measured FEV1, FVC, and calculated FEV1/FVC ratio.
- **MMRC Dyspnea Scale**: Graded breathlessness on a scale from 0 to 4.

Statistical Analysis Plan

1. **Data Management**
   - Data will be entered into a secured database.
   - Normality of continuous variables will be tested (Shapiro-Wilk).
   - Missing data will be imputed when appropriate; outliers will be identified (boxplots) and addressed.
2. **Descriptive Statistics**
   - Continuous variables: presented as mean ± SD or median (IQR).
   - Categorical variables: summarized as frequencies and percentages.
   - **Prevalence** of anxiety/depression (HADS) with 95% CI and **adherence levels** (MMAS-8) will be reported.
3. **Inferential Statistics**
   - **Associations**: Chi-square/Fisher's exact tests for categorical variables; ANOVA/Kruskal-Wallis for mean MMAS-8 comparisons.
   - **Predictors of low adherence**: Binary logistic regression with independent variables (anxiety/depression severity, age, gender, COPD severity, comorbidities); OR with 95% CI reported.
   - **Effect on MMAS-8**: Multiple linear regression adjusting for confounders.
4. **Qualitative Analysis**
   - Open-ended responses on adherence barriers will undergo thematic analysis to complement quantitative results.
5. **Sensitivity Analysis**
   - Subgroup analyses by COPD severity; multiple imputation for missing key variables.
6. **Statistical Significance & Software**
   - $p < 0.05$ considered significant.
   - Analyses performed using SPSS v28.0 or R.
7. **Reporting**
   - Results reported per STROBE guidelines and presented in tables and graphical formats.

RESULTS

Demographic Characteristics

A total of 100 COPD patients were included in the study. The majority were males (79.4%), with females comprising 20.6%. Most participants were aged 61–70 years (45.1%), followed by 51–60 years (18.6%) and 70–80 years (18.6%); 11.8% were below 50 years, and 5.9% were above 81 years.

There was a significant association between anxiety and depression (HADS) and adherence to respiratory therapy (MMAS) ($p < 0.001$). Patients with abnormal HADS scores showed lower adherence, with 96% in the low adherence group, while those with borderline abnormal scores demonstrated better adherence. These findings highlight the strong influence of psychological factors on treatment adherence and the need for integrating mental health support into COPD management.

Smoking and Alcohol Consumption

Among the participants, 71.6% were smokers and 28.4% were non-smokers. Most smokers (69.6%) were chronic, while 2.0% were passive smokers. Alcohol consumption was reported by 37.3% of participants, with 33.3% identified as chronic drinkers and 3.9% as occasional drinkers. The majority (62.7%) were non-alcoholic. These findings indicate a high prevalence of chronic smoking and significant alcohol use among COPD patients.

Respiratory Symptoms and Clinical Characteristics

Cough was reported by 88.2% of patients, with 83.3% experiencing cough with expectoration. Shortness of breath was highly prevalent, affecting 96.1% of participants.

According to GOLD classification, no patients were in Grade 1. Most were classified as Grade 3 (46.1%), followed by Grade 4 (30.4%) and Grade 2 (23.5%), indicating a predominance of moderate to severe COPD cases.

Based on the MMRC dyspnea scale, most patients had Grade 3 dyspnea (64.7%), followed by Grade 4 (26.5%) and Grade 2 (8.8%). No patients were classified as Grade 1, reflecting a predominance of moderate to severe dyspnea among the study population.

TABLE : SUMMARY OF DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF COPD PATIENTS

| Parameter	Category	n (%)	Key Findings/Associations
Gender	Male	79 (79.4%)	Majority were males
	Female	21 (20.6%)	—
Age (years)	<50	12 (11.8%)	Most patients aged 61–70
	51–60	19 (18.6%)	—
	61–70	45 (45.1%)	—
	70–80	19 (18.6%)	—
	>81	6 (5.9%)	—
Smoking Status	Smokers	71 (71.6%)	69.6% chronic, 2% passive
	Non-smokers	29 (28.4%)	—
Alcohol Consumption	Alcoholic	37 (37.3%)	33.3% chronic, 3.9% occasional
	Non-alcoholic	63 (62.7%)	—
Respiratory Symptoms	Cough	88 (88.2%)	83.3% had cough with expectoration
	Shortness of breath	96 (96.1%)	Highly prevalent
GOLD Classification	Grade 1	0 (0%)	Most were in Grade 3 (46.1%)
	Grade 2	23 (23.5%)	—
	Grade 3	46 (46.1%)	—
	Grade 4	30 (30.4%)	—
MMRC Dyspnea Scale	Grade 1	0 (0%)	Predominantly Grade 3 and 4
	Grade 2	9 (8.8%)	—
	Grade 3	65 (64.7%)	—
	Grade 4	26 (26.5%)	—

Spirometry

Spirometry results showed that most participants (83.3%) had an obstructive pattern, while 8.8% had a mixed pattern and 7.8% had a restrictive pattern. Regarding severity, 42.2% of patients had severe disease and 26.5% had very severe disease, while moderate and mild cases were less common (14.7% and 16.7%, respectively). This indicates that the majority had advanced airflow limitation.

COPD Assessment Test (CAT) Score

More than half of the patients (54.9%) had medium CAT scores, while 45.1% had high scores, indicating that most participants experienced moderate to high symptom burden with significant impact on quality of life.

FIGURE: SPIROMETRY AND COPD ASSESSMENT TEST (CAT) RESULTS
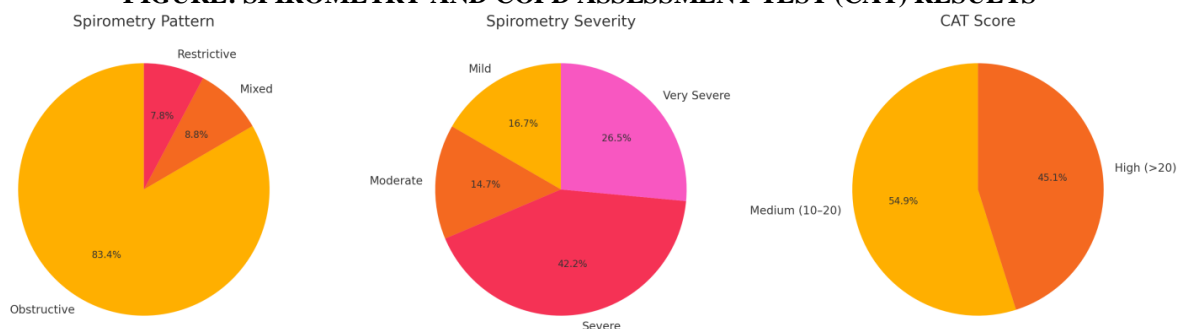
Psychological Comorbidities in COPD Patients

The study revealed a **high prevalence of psychological distress** among COPD patients. Anxiety, defined as HADS-A ≥11, was observed in **48.5%**, while depression (HADS-D ≥11) was present in **41.2%** of participants. These findings underscore the substantial burden of mental health disorders in this population, which may exacerbate disease outcomes and complicate management.

Adherence to Therapy

Medication adherence, assessed using the MMAS-8, was generally poor. The majority of patients (**68.6%**) demonstrated **low adherence**, while only **25.5%** achieved **medium adherence**, and a mere **5.9%** were **highly adherent**. This low adherence rate reflects the significant challenges in maintaining optimal treatment regimens in the presence of psychological comorbidities.

TABLE: COMPARISON AND CORRELATION OF PSYCHOLOGICAL COMORBIDITIES WITH MEDICATION ADHERENCE IN COPD PATIENTS

Parameter	Category	n (%)	Observation
Psychological Comorbidity	Anxiety (HADS-A ≥11)	48 (48.5%)	High prevalence of anxiety among COPD patients
	Depression (HADS-D ≥11)	41 (41.2%)	Significant proportion with depressive symptoms
Medication Adherence (MMAS-8)	Low	69 (68.6%)	Most patients had poor adherence
	Medium	26 (25.5%)	Some patients maintained moderate adherence
	High	6 (5.9%)	Very few achieved optimal adherence

Statistical Association:

TABLE: STATISTICAL ASSOCIATIONS BETWEEN PSYCHOLOGICAL DISTRESS, DISEASE SEVERITY, AND MEDICATION ADHERENCE IN COPD PATIENTS

Analysis	Variables Compared	Statistical Test	Value	p-value	Interpretation
Correlation	HADS (Anxiety & Depression) vs. MMAS-8 (Adherence)	Pearson Correlation (r)	–0.457	<0.001	Strong **inverse correlation**: higher psychological distress → lower adherence
Association	HADS (Anxiety & Depression) vs. MMAS-8 (Adherence)	Chi-square (χ^2)	22.069	<0.001	Significant association: psychological distress is linked to poor adherence
Association with Disease Severity	GOLD Stage vs. HADS (Anxiety & Depression)	Correlation/Chi-square	—	<0.05	Higher GOLD stages are associated with elevated HADS scores, indicating worse mental health with disease progression

- A **strong inverse correlation** (r = –0.457, p < 0.001) was found between HADS scores (anxiety and depression) and MMAS-8 adherence, indicating that **higher psychological distress leads to lower adherence**.

- **Chi-square analysis** (χ^2 = 22.069, p < 0.001) confirmed a **significant association between anxiety/depression and poor adherence**.
- Disease severity, as reflected by **higher GOLD stages**, was significantly associated with elevated HADS scores, suggesting that **progression of COPD amplifies psychological distress**, further impairing adherence and overall quality of life.

These results highlight the **critical interplay between psychological comorbidities, disease severity, and treatment adherence**, emphasizing the need for **integrated management approaches** that address both physical and mental health in COPD care.

DISCUSSION

Our study demonstrated a **high prevalence of anxiety (48.5%) and depression (41.2%)** among COPD patients, with a **significant negative correlation** between psychological distress and adherence to respiratory therapy. These findings are consistent with previous reports showing anxiety prevalence of 10–55% and depression prevalence of 7–42% in COPD, varying by disease severity and assessment tools [14,15].

The observed **association between high HADS scores and poor medication adherence** aligns with Di Marco et al., who similarly reported reduced inhaler adherence among COPD patients with elevated anxiety and depression scores [05].

Furthermore, our results highlight the **impact of psychological distress on disease progression**, as higher HADS scores correlated with increased GOLD stage severity. Previous research supports that anxiety and depression exacerbate COPD outcomes by worsening dyspnea perception, increasing exacerbation rates, and contributing to higher morbidity [16]. This relationship may be mediated by **systemic inflammation, reduced physical activity, and impaired self-management behaviors** [17,18].

The prevalence of **anxiety (48.5%)** and **depression (41.2%)** in our study is within the range reported by prior meta-analyses [19], but slightly higher than that observed in Western populations. This difference may relate to variations in healthcare access, socioeconomic status, and cultural attitudes toward mental health [20]. Unlike Ng et al., who found higher anxiety rates in female COPD patients [21], we observed **no gender differences**.

Our findings also showed a **greater impact of depression on pulmonary rehabilitation adherence** compared to earlier studies. While Yohannes et al. reported depression affecting participation but not exercise performance [03], our results suggest depression substantially influences overall adherence, potentially due to differences in follow-up duration and program structure.

These results highlight the **importance of integrating mental health screening** into COPD care. Routine use of tools like HADS could help identify at-risk patients early. Incorporating interventions such as **cognitive behavioral therapy (CBT)** and mental health–focused pulmonary rehabilitation may improve adherence and outcomes [22]. A **multidisciplinary approach** involving respiratory therapists, psychologists, and physiotherapists is recommended to optimize management [23].

From a research perspective, our findings support that **addressing psychological distress may improve therapy adherence and disease outcomes**. Future studies should include **longitudinal designs** to establish causality, and **RCTs** to evaluate the impact of targeted mental health interventions. Additionally, qualitative research exploring patient perspectives and **multi-center studies** in diverse populations would enhance generalizability. The use of **digital health tools** for symptom monitoring and adherence tracking offers promising avenues for better COPD management.

Limitations

- Cross-sectional design limits causality inference.
- Self-reported adherence may be subject to recall and social desirability bias.
- Single-center design may limit generalizability.
- Future research should address these gaps to strengthen evidence on the interplay between psychological distress and COPD outcomes.

CONCLUSION

This study highlights the substantial impact of anxiety and depression on COPD outcomes, particularly regarding treatment adherence. Incorporating mental health screening and interventions into routine COPD care can significantly improve adherence and patient quality of life. A multidisciplinary approach involving pulmonologists, psychologists, and rehabilitation experts is imperative for comprehensive COPD management.

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