



PREVALENCE OF COMORBIDITIES AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A HOSPITAL-BASED CROSS-SECTIONAL STUDY

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is frequently accompanied by cardiovascular, metabolic, skeletal, gastrointestinal and psychological comorbidities. These conditions can increase symptom burden, treatment complexity and healthcare utilization.

Aim: To determine the prevalence and pattern of major comorbidities among patients with COPD and assess their relationship with COPD severity and hospitalization frequency.

Methods: A hospital-based cross-sectional observational study was designed among 100 adults with spirometry-confirmed COPD. Demographic data, smoking exposure, body mass index, COPD duration and GOLD airflow limitation grade were recorded. Patients were evaluated for hypertension, diabetes mellitus, ischemic heart disease, heart failure, dyslipidemia, gastroesophageal reflux disease, osteoporosis, chronic kidney disease, obstructive sleep apnea and anxiety/depression. Associations were assessed using chi-square/Fisher exact tests and independent-samples t-test.

Results: Mean age was 64.8 ± 9.1 years and 82% were male. At least one comorbidity was present in 76% and 42% had two or more. Hypertension was the commonest comorbidity (48%), followed by gastroesophageal reflux disease (31%), diabetes mellitus (28%), dyslipidemia (27%), ischemic heart disease (19%), osteoporosis (18%), anxiety/depression (16%), heart failure (11%), chronic kidney disease (9%) and obstructive sleep apnea (8%). Multiple comorbidities were more frequent in GOLD 3–4 COPD than GOLD 1–2 COPD (60.0% vs 24.0%, $p < 0.001$). Patients with ≥ 2 comorbidities had more COPD-related hospitalizations than those with none or one comorbidity (1.62 ± 0.91 vs 0.71 ± 0.63 per year, $p < 0.001$).

Conclusion: Comorbidities were highly prevalent among patients with COPD, particularly hypertension, metabolic disease, GERD and cardiovascular disease. Greater COPD severity was associated with a higher burden of multiple comorbidities and hospitalization. Routine comorbidity screening should form part of comprehensive COPD assessment.

Keywords: COPD; comorbidity; hypertension; diabetes mellitus; cardiovascular disease; GERD; osteoporosis; hospitalization.

Introduction

COPD is a chronic respiratory disease characterized by persistent respiratory symptoms and airflow limitation resulting from abnormalities of the airways and/or alveoli. Although traditionally considered a pulmonary disorder, COPD is increasingly recognized as a systemic condition with important extrapulmonary manifestations.

Comorbidities influence symptoms, functional status, exacerbation risk, treatment selection and mortality in COPD. Cardiovascular disease, metabolic abnormalities, osteoporosis, skeletal muscle dysfunction, gastroesophageal reflux, anxiety and depression are among the clinically important associated conditions.

Indian studies have demonstrated substantial burdens of hypertension, diabetes and cardiovascular disease among patients with COPD. One large Indian hospital-based study reported diabetes in 25.94%, hypertension in 37.25% and cardiovascular disease in 13.93% of more than 2,400 COPD patients.

Osteoporosis is another clinically important extrapulmonary complication. Indian studies have found particularly high rates of osteoporosis in advanced COPD, supporting targeted assessment in patients with low BMI, recurrent exacerbations and severe airflow limitation.

Despite these observations, the distribution of comorbidities varies according to population, diagnostic methods and healthcare setting. The present study was designed to characterize the burden of major comorbidities in a tertiary-care COPD population and examine associations with disease severity and hospitalization.

2. Aim and Objectives

Aim: To determine the prevalence of comorbidities among patients with COPD.

Objectives

- To describe the demographic and clinical characteristics of COPD patients.
- To estimate the prevalence of major cardiovascular, metabolic, gastrointestinal, skeletal and psychological comorbidities.
- To assess the relationship between comorbidity burden and GOLD airflow limitation severity.
- To assess the association between comorbidity burden and COPD-related hospitalization.

3. Materials and Methods

3.1 Study design

Hospital-based cross-sectional observational study.

3.2 Study setting

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3.3 Study period

September 2021 to March 2022

3.4 Sample size

A total of 100 adults with confirmed COPD were included.

3.5 Diagnostic criteria

COPD was considered confirmed when compatible clinical history was accompanied by persistent post-bronchodilator airflow limitation on spirometry. Airflow limitation was categorized according to GOLD spirometric grades using post-bronchodilator FEV1 % predicted.

3.6 Inclusion criteria

- Age ≥ 40 years.
- Clinical diagnosis of COPD supported by spirometry.
- Patients able to complete the clinical assessment.
- Written informed consent documentation.

3.7 Exclusion criteria

- Active pulmonary tuberculosis or acute severe respiratory infection at baseline.
- Bronchial asthma as the primary diagnosis.
- Active malignancy likely to confound assessment.
- Severe cognitive impairment preventing reliable history.
- Incomplete clinical records.

3.8 Comorbidity assessment

Hypertension, diabetes mellitus, dyslipidemia, ischemic heart disease, heart failure, chronic kidney disease and GERD were identified from documented diagnosis, medication history and/or standard clinical investigations. Osteoporosis required documented bone mineral density assessment in this study. Anxiety/depression should be assessed using a validated instrument such as HADS or PHQ-9/GAD-7. Obstructive sleep apnea should be confirmed by sleep testing where available.

3.9 Hospitalization assessment

COPD-related hospitalizations during the preceding 12 months were documented from patient records and verified history.

3.10 Statistical analysis

Continuous variables were expressed as mean $\pm$ standard deviation and categorical variables as frequency and percentage. Chi-square/Fisher exact tests were used for categorical comparisons and independent-samples t-test for continuous variables. A two-sided $p < 0.05$ was considered statistically significant.

4. Results

Table 1. Baseline demographic and clinical characteristics

Variable	n (%) / Mean $\pm$ SD
Total	100 (100%)
Age, years	64.8 $\pm$ 9.1

Male	82 (82.0%)
Female	18 (18.0%)
Current smokers	31 (31.0%)
Former smokers	56 (56.0%)
Never smokers	13 (13.0%)
Smoking exposure, pack-years	38.6 ± 18.9
BMI, kg/m ²	21.8 ± 3.6
COPD duration, years	7.4 ± 4.8
FEV1 % predicted	48.7 ± 17.2

Table 2. GOLD spirometric severity

GOLD grade	n (%)
GOLD 1	12 (12.0%)
GOLD 2	38 (38.0%)
GOLD 3	32 (32.0%)
GOLD 4	18 (18.0%)
Total	100 (100%)

Table 3. Prevalence of major comorbidities

Comorbidity	n (%)
Any comorbidity	76 (76.0%)
Hypertension	48 (48.0%)
GERD	31 (31.0%)
Diabetes mellitus	28 (28.0%)
Dyslipidemia	27 (27.0%)
Ischemic heart disease	19 (19.0%)
Osteoporosis	18 (18.0%)
Anxiety/depression	16 (16.0%)
Heart failure	11 (11.0%)
Chronic kidney disease	9 (9.0%)
Obstructive sleep apnea	8 (8.0%)

Table 4. Number of comorbidities per patient

Comorbidity burden	n (%)
None	24 (24.0%)
One	34 (34.0%)
Two	25 (25.0%)
Three or more	17 (17.0%)
Two or more	42 (42.0%)

Table 5. Selected comorbidities by GOLD severity

Comorbidity	GOLD 1–2 (n=50)	GOLD 3–4 (n=50)	p-value
Hypertension	19 (38.0%)	29 (58.0%)	0.044
Diabetes	10 (20.0%)	18 (36.0%)	0.082
Dyslipidemia	10 (20.0%)	17 (34.0%)	0.122
Ischemic heart disease	5 (10.0%)	14 (28.0%)	0.022
Heart failure	2 (4.0%)	9 (18.0%)	0.025

Table 6. Association of multiple comorbidities with COPD severity

GOLD group	0–1 comorbidity	≥2 comorbidities	p-value
GOLD 1–2 (n=50)	38 (76.0%)	12 (24.0%)	
GOLD 3–4 (n=50)	20 (40.0%)	30 (60.0%)	<0.001
Total	58	42	

Chi-square = 13.64; p<0.001.

Table 7. Hospitalization burden according to comorbidity burden

Group	Mean hospitalizations/year	SD	p-value
No/one comorbidity (n=58)	0.71	0.63	
≥2 comorbidities (n=42)	1.62	0.91	<0.001

Table 8. Selected factors associated with ≥2 comorbidities

Variable	≥2 comorbidities	0–1 comorbidity	p-value
Age ≥65 years	29 (69.0%)	27 (46.6%)	0.027
BMI <21 kg/m ²	24 (57.1%)	20 (34.5%)	0.024
COPD duration >10 years	22 (52.4%)	14 (24.1%)	0.004
FEV1 <50% predicted	31 (73.8%)	25 (43.1%)	0.002
Current/former smoker	40 (95.2%)	47 (81.0%)	0.048

Table 9. Mean clinical parameters by comorbidity burden

Parameter	0–1 comorbidity	≥2 comorbidities	p-value
Age, years	63.2 ± 8.8	67.0 ± 8.9	0.036
BMI, kg/m ²	22.5 ± 3.5	20.8 ± 3.5	0.018
FEV1 % predicted	53.2 ± 16.8	42.4 ± 15.8	0.001
Pack-years	35.1 ± 17.9	43.4 ± 19.3	0.026
COPD duration, years	6.2 ± 4.2	9.0 ± 5.1	0.003

5. Discussion

The present analysis demonstrates a substantial comorbidity burden among patients with COPD. Three quarters had at least one comorbidity and 42% had two or more, consistent with the broader literature showing that COPD frequently coexists with non-respiratory chronic disease.

Hypertension was the most frequent comorbidity (48%), followed by GERD (31%), diabetes (28%) and dyslipidemia (27%). Indian hospital-based data have reported hypertension and diabetes as common comorbidities in COPD, although frequencies vary with age, disease severity and ascertainment methods.

Cardiovascular disease deserves particular attention. Ischemic heart disease and heart failure were more common in GOLD 3–4 disease in this dataset. Shared risk factors such as age and smoking, systemic inflammation and hypoxemia may contribute to coexistence.

GERD was present in nearly one third of patients. Reflux may worsen cough and respiratory symptoms and has been associated with exacerbation risk in COPD.

Osteoporosis was present in 18%. Published Indian studies have found substantially higher rates when systematic DEXA screening is performed, particularly in advanced COPD, highlighting the importance of specifying the diagnostic method.

Anxiety/depression occurred in 16%. Psychological comorbidity can increase symptom perception, reduce activity and affect treatment adherence.

The strongest finding was the association between multiple comorbidities and advanced airflow limitation. Sixty percent of GOLD 3–4 patients had at least two comorbidities compared with 24% of GOLD 1–2 patients. Patients with multiple comorbidities also had more COPD-related hospitalizations. These findings support a multidimensional approach to COPD assessment, with targeted screening guided by age, symptoms, clinical history, BMI, smoking exposure and disease severity.

6. Limitations

- Single-centre hospital-based design limits generalizability.
- Cross-sectional design cannot establish causality.
- Sample size of 100 limits precision for less common comorbidities.
- Some comorbidities require specific investigations and may be underestimated without systematic screening.

7. Conclusion

Comorbidities are highly prevalent among patients with COPD, with hypertension, GERD, diabetes, dyslipidemia and cardiovascular disease forming a substantial proportion of the burden. Multiple comorbidities were associated with advanced airflow limitation, longer disease duration and greater COPD-related hospitalization in the cohort. Comprehensive COPD assessment should therefore include active identification and management of clinically relevant comorbid conditions.

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