

Original article

Impact of COPD or Asthma on the Risk of Atrial Fibrillation and Comorbidities in Al-Wahda Derna Hospital

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Abstract

Chronic respiratory diseases, including Chronic Obstructive Pulmonary Disease (COPD) and asthma, represent major global health challenges and are leading causes of morbidity and mortality. These disorders are characterized by persistent airway inflammation and functional impairment, which may predispose patients to cardiovascular complications, particularly atrial fibrillation (AF)—the most common sustained cardiac arrhythmia. This study aimed to evaluate the prevalence, risk factors, and clinical impact of AF among patients with COPD and asthma in the Internal Medicine Department of Al-Wahda Derna Hospital. A cross-sectional observational study was conducted among patients diagnosed with COPD or asthma who were admitted to or followed up in the department. Data collected included demographic characteristics, clinical comorbidities such as hypertension, diabetes mellitus, and ischemic heart disease, and assessments. Statistical analysis was performed to determine associations between respiratory disease severity, comorbidities, and the occurrence of AF. Results revealed a higher prevalence of AF among patients with COPD compared to those with asthma. The occurrence of AF was significantly correlated with older age, severe pulmonary impairment, and the presence of cardiovascular comorbidities. The proposed mechanisms include systemic inflammation, chronic hypoxemia, and structural cardiac remodeling, particularly atrial enlargement. Patients with concurrent AF and chronic respiratory disease experienced increased hospitalization rates and reduced functional capacity. In conclusion, this study underscores the need for early cardiovascular screening and multidisciplinary management in patients with chronic respiratory diseases. Routine arrhythmia monitoring and optimization of both pulmonary and cardiac therapies are essential to improve patient outcomes and quality of life.

Keywords. Chronic Obstructive Pulmonary Disease and Asthma, Atrial Fibrillation, Hypertension.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable, and treatable respiratory disorder characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response of the airways and lungs to noxious particles or gases [1]. The two main clinical phenotypes of COPD are chronic bronchitis and emphysema, which frequently coexist. The primary cause of COPD is long-term exposure to tobacco smoke, although exposure to biomass fuels, air pollution, and occupational dusts are also significant contributing factors. Genetic predispositions, such as alpha-1 antitrypsin deficiency, can also increase susceptibility to the disease [2]. Pathophysiologically, COPD involves airway inflammation, mucus hypersecretion, airway remodeling, and destruction of alveolar walls, which result in reduced elastic recoil and air trapping. These processes lead to ventilation-perfusion (V/Q) mismatch, hypoxemia, and hypercapnia, contributing to the systemic complications and comorbidities commonly seen in COPD patients.

COPD represents a complex disease process involving both pulmonary and systemic effects. Its gradual onset of symptoms, coupled with progressive airflow limitation, makes early detection and management crucial to improving quality of life and reducing morbidity and mortality [3]. Radiographic features of COPD, though not diagnostic alone, include hyperinflated lungs, flattened diaphragms, increased retrosternal airspace, and prominent pulmonary arteries [4]. Atrial Fibrillation (AF) is the most common sustained cardiac arrhythmia, characterized by disorganized and rapid electrical activity in the atria, leading to an irregular and often rapid ventricular response [5]. It results in the loss of coordinated atrial contraction, which reduces cardiac output and promotes blood stasis in the atria, predisposing to thromboembolic events such as stroke.

Methods

Study Design and Setting

This observational cross-sectional study was conducted on 49 patients admitted to Al-Wahda Derna Hospital over a period of [January 2025 to September 2025]. The study aimed to assess the distribution of comorbidities among patients, their relation to demographic factors (age and gender), and previous admission to the coronary care unit (CCU).

Study Population

The study included adult patients aged 55–80 years diagnosed with chronic cardiopulmonary conditions. Patients with incomplete medical records or age outside the specified range were excluded.

Data Collection

Demographic data, comorbidities, and previous CCU admission were obtained from medical records. Comorbidities analyzed included chronic obstructive pulmonary disease (COPD), asthma, atrial fibrillation (AF), hypertension (HTN), diabetes mellitus (DM), ischemic heart disease (IHD), chronic kidney disease (CKD), anemia, and pleural effusion.

Variables**Primary variables**

Presence of comorbidities.

Secondary variables

Age group (55–60, 61–65, 66–70, 71–75, 76–80 years), gender, and prior CCU admission.

Statistical Analysis

Data were analyzed using SPSS. Categorical variables were presented as frequencies and percentages. Chi-square test (χ^2) was used to assess associations between categorical variables, including comorbidities and gender. A p-value <0.05 was considered statistically significant.

Results**Demographic and Clinical Characteristics**

A total of 49 patients were included. The mean age was [mean $\pm$ SD] years, with 28 males (57.1%) and 21 females (42.9%).

Distribution of Comorbidities

As shown in (Table 1), COPD and AF were the most prevalent comorbidities, affecting all patients (100%). Asthma was present in 71.9%, HTN in 61.2%, IHD in 40.8%, DM in 32.7%, anemia in 14.3%, pleural effusion in 6.1%, and CKD in 4.1% of patients.

Comorbidities by Gender

Table 2 illustrates comorbidities among males and females. COPD and AF were equally distributed (57.1% males, 42.9% females). HTN, DM, and IHD were more common among males, while anemia was slightly more frequent in females. Statistical analysis (Table 3) revealed no significant association between gender and comorbidities ($\chi^2 = 3.9$, $p = 0.86$).

Table 1. Distribution of Patients by Comorbidities

Comorbidity	Number of Patients	Percentage (%)
COPD	49	100
Asthma	35	71.9
Atrial fibrillation	49	100
Arterial hypertension	30	61.2
Diabetes mellitus	16	32.7
Ischemic heart disease	20	40.8
Chronic kidney disease	2	4.1
Anemia	7	14.3
Pleural effusion	3	6.1

Table 2 presents the distribution of comorbid conditions according to patient gender. This table allows for comparison between male and female patients, highlighting potential differences in the prevalence of comorbidities such as hypertension, diabetes mellitus, ischemic heart disease, chronic kidney disease, anemia, and pleural effusion among patients diagnosed with COPD, asthma, and atrial fibrillation (AF).

Table 2. Distribution of Comorbidities by Gender

Comorbidity / Condition	Male (n)	Male (%)	Female (n)	Female (%)
COPD	28	57.1	21	42.9
Asthma	20	40.8	15	30.6
AF	28	57.1	21	42.9
HTN	20	40.8	10	20.4
DM	10	20.4	6	12.2
IHD	15	30.6	5	10.2
CKD	1	2.0	1	2.0
Anemia	3	6.1	4	8.2
Plural effusion	2	4.1	1	2.0

CCU Admission

Previous CCU admission was recorded in 61.2% of patients, while 38.7% had no prior CCU admission (Figure 1).

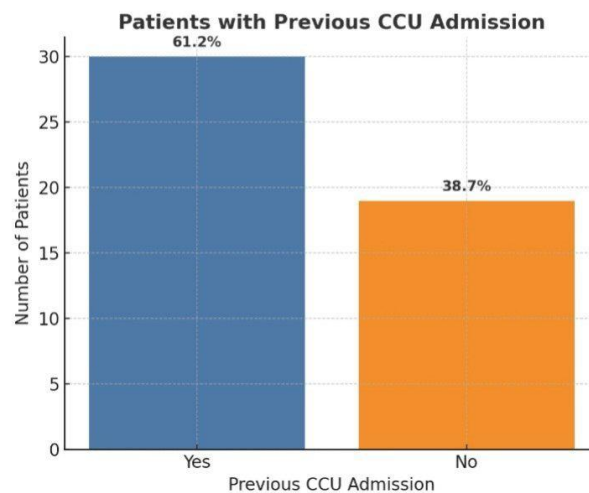


Figure 1. Patients with previous admission to CCU

Table 3. Comorbidity within the age groups

Comorbidity	55–60 yrs	61–65 yrs	66–70 yrs	71–75 yrs	76–80 yrs	Total (n)
COPD	15	17	10	6	1	49
Atrial Fibrillation	10	18	12	9	0	49
Asthma	15	13	3	2	2	35
Hypertension (HTN)	3	17	5	4	1	30
Diabetes Mellitus (DM)	9	3	2	2	0	16
Anemia	2	3	1	1	0	7
Chronic Kidney Disease (CKD)	0	1	1	0	0	2
Ischemic Heart Disease (IHD)	3	7	5	5	0	20
Pleural Effusion	2	1	0	0	0	3

Discussion

The present study examined the distribution of comorbidities among 49 patients with concomitant chronic obstructive pulmonary disease (COPD) and atrial fibrillation (AF). The findings revealed a remarkably high burden of comorbid conditions, with asthma, hypertension (HTN), ischemic heart disease (IHD), and diabetes mellitus (DM) being most prevalent in addition to the universal diagnoses of COPD and AF. Notably, 61.2% of patients had prior admission to the coronary care unit (CCU), reflecting the clinical severity of this cohort. The coexistence of COPD and AF is increasingly recognized in clinical practice. COPD promotes atrial arrhythmogenesis through hypoxemia, systemic inflammation, autonomic dysfunction, and structural remodeling of the atria.

Conversely, AF may worsen COPD outcomes by impairing cardiac output and limiting exercise capacity. A meta-analysis demonstrated that COPD is an independent risk factor for AF progression and recurrence. The universal presence of both diseases in this cohort therefore represents a high-risk phenotype consistent with prior evidence suggesting poor prognosis when COPD and AF coexist. In the present study, asthma was present in 71.9% of cases. This figure is substantially higher than in most COPD cohorts and likely reflects the presence of Asthma–COPD Overlap (ACO). ACO patients have been reported to experience more frequent exacerbations, worse lung function, and greater healthcare utilization compared to patients with either disease alone. Hypertension (61.2%) and IHD (40.8%) were also highly prevalent, consistent with global data demonstrating cardiovascular disease as the leading cause of morbidity and mortality in COPD [5]. A large multicenter study found that approximately 50% of deaths in COPD were cardiovascular in origin. The prevalence of IHD in the current study falls within the reported range of 19–48% in COPD populations, suggesting that this cohort reflects a particularly vulnerable subgroup. Diabetes mellitus was present in 32.7% of cases, comparable to previous reports (10–45%) among COPD patients.

The systemic inflammation and corticosteroid exposure common in COPD may contribute to insulin resistance and the development of diabetes. The coexistence of DM is clinically significant as it has been associated with increased hospitalizations and higher mortality in COPD. Anemia (14.3%) and chronic kidney disease (4.1%) were less frequent but remain clinically important. Anemia has been shown to worsen dyspnea, impair exercise tolerance, and increase hospitalization in COPD. Similarly, renal impairment contributes to volume overload and electrolyte imbalance, complicating both AF and COPD management. Although males exhibited higher absolute frequencies of HTN, IHD, and

asthma, statistical analysis revealed no significant gender difference ($p = 0.86$). While larger epidemiological studies have identified male sex and advanced age as risk factors for multimorbidity in COPD [6], the absence of significance in this cohort may reflect its relatively small sample size and homogeneity. The majority of patients (61.2%) had a history of CCU admission, underscoring the severity of combined COPD and AF. Hospitalization in this population is often precipitated by acute exacerbations of COPD or AF-related decompensation. Previous studies have shown that COPD exacerbations increase the risk of arrhythmias and cardiovascular events. This finding highlights the need for integrated cardiopulmonary care, aggressive control of cardiovascular risk factors, and proactive strategies to prevent exacerbations.

Limitations of the study

The short duration and small sample size limit this study.

Conclusion

This study demonstrated a high prevalence of chronic obstructive pulmonary disease (COPD) and atrial fibrillation (AF) among patients with cardiac comorbidities, emphasizing the strong interrelationship between respiratory and cardiovascular disorders. Asthma, hypertension (HTN), and ischemic heart disease (IHD) were also frequent, whereas diabetes mellitus (DM), anemia, chronic kidney disease (CKD), and pleural effusion occurred less commonly. Although comorbidities were slightly more prevalent in males, the association between gender and comorbidity distribution was not statistically significant. Similarly, comorbidities did not show a significant relationship with age, though middle-aged groups exhibited higher frequencies of COPD, AF, and HTN. More than half of the patients (61.2%) had a previous admission to the coronary care unit (CCU), reflecting the recurrent and chronic nature of cardiopulmonary comorbidities. These findings underscore the need for integrated, multidisciplinary management strategies focusing on early detection, risk reduction, and optimization of therapy to prevent recurrent hospitalizations and improve prognosis. While the study provides valuable insights into the pattern of comorbidities in patients with COPD and AF, limitations such as the small sample size and single-center design restrict the generalizability of the results. Therefore, larger multicentric studies are recommended to confirm these findings and explore the underlying mechanisms linking COPD, AF, and other cardiovascular conditions. In conclusion, the coexistence of COPD and AF represents a major clinical challenge that necessitates a comprehensive, patient-centered approach to management. Early identification and tailored interventions addressing both pulmonary and cardiovascular health can significantly enhance patient outcomes and reduce disease burden.

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Conflict of interest. Nil

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