

FREQUENCY OF NEW-ONSET ATRIAL FIBRILLATION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS: INSIGHTS FROM A HOSPITAL-BASED CROSS-SECTIONAL STUDY

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INTRODUCTION

Progressive airflow restriction and tissue damage characterize chronic obstructive pulmonary disease (COPD), a prevalent and curable condition. It affects over 212.3 million people worldwide and is currently the fourth leading cause of death globally.¹ Tobacco smoking and household air pollution, mainly from the use of solid fuels for cooking and heating, are its major risk factors.^{2,3} Atrial fibrillation (AF) is a common cardiac arrhythmia, with an estimated 37.6 million people affected globally, representing approximately 0.51% of the global population.⁴ Several serious health issues, including coronary heart disease, stroke, pulmonary embolism, persistent congestive heart failure, and poor quality of life, have been linked to

ABSTRACT

OBJECTIVES

This study aimed to determine the frequency of new-onset atrial fibrillation (AF) in patients with chronic obstructive pulmonary disease (COPD).

METHODOLOGY

This cross-sectional study was conducted in the Department of Medicine at Hayatabad Medical Complex, Peshawar, Pakistan, from July 20, 2023, to January 15, 2025. Patients of COPD who were in normal sinus rhythm within the three months before admission were eligible for the study. Patients with the following were excluded: Ischemic heart disease, mitral valve disease, left-sided heart failure, diabetes mellitus, hypertension, hypo- or hyperkalemia, or thyroid disorders. A total of 147 patients who met the inclusion and exclusion criteria were enrolled in the study. All study participants underwent an electrocardiogram on admission and daily until discharge to look for new-onset AF.

RESULTS

Most patients were male (74.1%, n = 109) with a median age of 60 years (IQR: 53–67) and a median duration of COPD of 5 years (IQR: 4–7). New-onset AF was identified in 22 patients (15%; 95% CI: 9–21%). Patients with AF were significantly older than those without AF (71.5 years [IQR: 63.75–75.5] versus 58 years [IQR: 52–65], p < 0.001). Likewise, patients with AF had a significantly longer duration of COPD [8 years (IQR: 6 – 9)] than those without AF [5 years (IQR: 4 – 7)] (p<0.001). There was no significant difference in the frequency of AF by gender.

CONCLUSION

Older age and higher duration of COPD are significant risk factors for the development of AF in patients with COPD. Patients with COPD need regular surveillance for the timely diagnosis of AF and subsequent risk stratification to guide optimal management.

KEYWORDS: Chronic Obstructive Pulmonary Disease, Atrial Fibrillation, Frequency, Risk factor, Hospitalization

AF.^{5,6} Chronic obstructive pulmonary disease is increasingly acknowledged as a significant risk factor for new-onset AF.⁷ A study has reported new-onset AF in 8.42% of COPD patients.⁸ People with COPD have a 28% higher odds of developing AF compared to those without COPD.⁵ A meta-analysis by Jiale et al. in 2022 reported higher overall and cardiovascular mortalities in patients with AF and COPD than those with AF alone.⁹ The risk of ischemic cerebrovascular events in patients with COPD and AF is also 2.8 times higher than that of those with AF only.¹⁰ Apart from the increased morbidity and mortality, the co-existence of COPD and AF has therapeutic implications too.¹¹ Beta blockers, which negatively impact lung function, are often used to control the ventricular rate in AF. Conversely, beta agonists and theophylline, commonly prescribed to

improve airway function in COPD, can aggravate cardiac rhythm abnormalities. This therapeutic conflict presents a clinical challenge, often necessitating adjustments in the medications of COPD patients once they develop AF.¹² While AF is known to worsen the clinical course and increase the risk of adverse outcomes, its onset in COPD is often overlooked and underdiagnosed in resource-constrained developing countries like Pakistan. Given the lack of local and regional data, this study aims to determine the frequency and clinical risk factors of new-onset AF in COPD patients. This will be crucial for several reasons. First, it will enable targeted screening and, as a result, early recognition of AF in high-risk COPD patients. Secondly, early diagnosis will result in timely risk stratification and introduction of preventive measures to reduce the risk of complications such as thromboembolism and cardiovascular events. The integrated approach of managing comorbidities like AF in COPD patients will ultimately translate into better outcomes in these patients. Lastly, the study findings will ensure that our population gets due representation in the pooled data in systematic reviews on the topic.

METHODOLOGY

The cross-sectional study was conducted at the Department of Medicine, Hayatabad Medical Complex, Peshawar, Pakistan, from July 20, 2023, to January 15, 2025. The Institutional Review and Ethics Board of Hayatabad Medical Complex, Peshawar, approved the study. (No. 1310, dated: 06.06.2023). The inclusion criteria were patients with COPD who had documented evidence of a normal sinus rhythm, as indicated by an electrocardiogram performed within the three months preceding admission. COPD was defined as the presence of symptoms such as shortness of breath, sputum production, or chronic cough persisting for more than three months up to two consecutive years, along with an FEV1/FVC ratio of <70% of predicted values on post-bronchodilator spirometry.¹³ Atrial fibrillation was defined as an irregular pulse on examination, confirmed by irregular R-R intervals and absence or replacement of P-waves by fibrillatory waves on ECG.¹⁴ The exclusion criteria included diagnoses of ischemic heart disease, mitral valve disease, left-sided heart failure, diabetes mellitus, hypertension, hypo- or hyperkalemia, or thyroid disorders. The sample size was 147, with an 8.42% frequency of new-onset AF, a 4.5% absolute precision, and a 95% confidence level.⁸ All patients meeting the inclusion criteria underwent an initial assessment, which included a history, physical examination, and the following investigations: random blood sugar, thyroid function tests, serum electrolytes, and an

echocardiogram. Patients who met the inclusion and exclusion criteria after initial assessment were informed about the study. Those who agreed to participate were enrolled in the study through a consecutive sampling technique. All enrolled patients underwent an electrocardiogram (ECG) on admission and had daily ECGs until discharge. New-onset atrial fibrillation was diagnosed if a patient, having a normal sinus rhythm previously as outlined in the inclusion criteria, demonstrated changes typical of AF on the ECG performed on admission or thereafter during hospital stay. The data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 21. Normality of continuous variables (Age, Duration of COPD) was assessed using the Shapiro-Wilk test, and these were reported as median with interquartile range. Categorical variables (Gender, New-onset atrial fibrillation) were reported as frequencies and percentages. Between-group differences in the median age and duration of COPD were compared for significance using the Mann-Whitney test. Likewise, difference in gender-wise distribution was evaluated by the Chi-square test. A p-value below 0.05 was considered significant.

RESULTS

A total of 147 patients with COPD were included in the study. The median age of the participants was 60 years (interquartile range [IQR]: 53-67), and the median duration of COPD was 5 years (IQR: 4-7). Most patients were male (74.1%, n = 109). New-onset atrial fibrillation (AF) was identified in 22 patients (15%; 95% CI: 9 - 21%). Table 1 reviews the characteristics of the study participants.

Table 1: Pre and Post, 3 & 6 month Astigmatism

Variables		Median (IQR) / No. (%)
Age, years		60 (53 - 67)
Duration of COPD, Years		05 (4 - 7)
Gender	Male	109 (74.1%)
	Female	38 (25.9%)
New onset AF	No	125 (85%)
	Yes	22 (15%)

The median age of patients who developed new-onset atrial fibrillation (AF) was 71.5 years (IQR: 63.75 – 75.5), significantly higher than 58 years (IQR: 52 – 65) in those without AF ($P < 0.001$). Similarly, the median duration of COPD was significantly longer in patients with new-onset AF [8 years (IQR: 6 – 9)] compared to those without AF [5 years (IQR: 4 – 7)], also demonstrating a statistically significant difference ($p < 0.001$). In terms of gender, 18 out of 109 male patients (16.5%) and 4 out of 38 female patients (10.5%) developed new-onset atrial fibrillation. However, this difference was not significant ($p = 0.373$). (Table 2).

Table 2: Comparison of Risk Factors between COPD Patients with and without New Onset Atrial Fibrillation

Variables		New Onset AF		Test statistic	P-Value
		No (n=125)	Yes(n=22)		
Age (years), Median (IQR)		58 (52 - 65)	71.5 (63.75 - 75.5)	673.5	<0.001*
Duration of COPD (years), Median (IQR)		05 (4 - 7)	08 (6 - 9)	703.5	<0.001*
Gender,	Male	91 (83.5%)	18 (16.5%)	0.794	0.373*
	No(%) Female	34 (89.5%)	04 (10.5%)		

*Mann-Whitney U test, **Chi-square test

DISCUSSION

Chronic obstructive pulmonary disease is one of the significant causes of morbidity and mortality worldwide. Likewise, AF is the most common cardiac arrhythmia. The co-existence of COPD and AF has significant implications for the management of these patients. This study aimed to determine the frequency and risk factors of new-onset AF in patients with COPD. This study identified new-onset AF in 15% (95% CI: 9-21%) of patients with COPD. This is consistent with or slightly higher than the prevalence figures reported in other studies. For instance, a review by Kotlyarov and Lyubavin in 2024 indicates that approximately 8% of patients with COPD have AF.¹⁵ Similarly, Huang et al. reported that 11.5% of patients with AF had concomitant COPD in a multicenter registry study.¹⁶ The Rotterdam Study by Grymonprez et al. reported a 28% increased AF risk in individuals with COPD.⁵ The meta-analysis by Chen et al. also supports a high prevalence of AF among COPD patients.¹⁷ The observed 15% new-onset AF in this study underscores the significant burden of this comorbidity in the COPD population, aligning with the general trend of increased AF risk and prevalence in these patients as reported in the literature. The median age of patients who developed new-onset AF (71.5 years) was significantly higher than in those without AF (58 years, $p < 0.001$). This strong association between older age and AF in COPD patients is well-supported by systematic reviews and meta-analyses. Qiangru Huang et al. identified older age (specifically above 65 years and above 75 years) as a significant demographic risk factor for AF in COPD patients.¹⁸ Similarly, Kotlyarov and Lyubavin (2024) also highlighted older age (over 65 years) as a key demographic characteristic associated with the risk of new-onset AF in COPD.¹⁵ These consistent findings across multiple studies suggest that age-related physiological changes, combined with the systemic effects of COPD, contribute substantially to the increased susceptibility to AF in this patient group. A notable finding in our study is the significantly longer median duration of COPD in patients who developed new-onset AF (8 years)

compared to those who did not (5 years, $p < 0.001$). This suggests a cumulative effect of the disease on cardiac health. This observation is supported by the systematic review and meta-analysis by Qiangru Huang et al.¹⁸ which proposes that the pathogenesis of AF related to COPD is mainly due to cardiac dysfunction resulting from the "chronic duration of COPD." This long-standing disease burden increases the risk of cardiovascular-related factors, which, in turn, elevates the risk of AF in COPD patients. The results of this study provide further evidence of this pathophysiological link, emphasizing the importance of long-term disease management in mitigating the risk of AF.

LIMITATIONS

Given the high prevalence of both COPD and AF, this study addresses an important area of clinical concern. The study findings have direct clinical implications for patients with COPD, as they can lead to targeted screening of COPD patients for AF and their timely risk stratification to prevent complications like thromboembolism. It fills a gap in local and regional data, ensuring the Pakistani population is represented in systematic reviews and meta-analyses on the topic. This study has several potential limitations that must be acknowledged. Selection bias may have influenced the findings, as all patients were recruited from a single tertiary care medical ward, thus limiting the generalizability of the results. Recall bias is another limitation, as variables such as duration of COPD were based on patient self-report, which may be subject to memory inaccuracies or underreporting. Additionally, the study may be affected by confounding bias as variables such as smoking, body mass index, drug history, and the use of oxygen therapy were not collected or analyzed. Studies involving a larger sample of patients, preferably multicenter studies, and incorporating a broader range of risk factors may validate the findings of this study, reduce bias, and enhance the generalizability of the results.

CONCLUSIONS

New-onset AF was observed in 15% patients with COPD. Older age and longer duration of COPD were significant risk factors for the development of AF in these patients. The frequency of new-onset AF did not differ significantly by gender. Routine screening for new-onset AF in all patients with COPD is recommended. Early diagnosis and risk stratification, along with the implementation of appropriate therapy (antiplatelets or anticoagulation), will prevent subsequent complications and improve outcomes. Studies with larger samples and a broader range of risk factors are warranted to explore the association between

COPD and AF.

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The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.



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