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FREQUENCY OF ATRIAL FIBRILLATION IN PATIENTS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE PRESENTING TO MAYO HOSPITAL, LAHORE

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Abstract

Background: *Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide and is frequently complicated by cardiovascular comorbidities.* ***Objective:*** *To determine the frequency of atrial fibrillation in patients with COPD presenting to Mayo Hospital, Lahore, and to assess its association with demographic and clinical variables.* ***Methodology:*** *This descriptive cross-sectional study was conducted in the Department of General Medicine and Pulmonology, Mayo Hospital, Lahore, from November 2024 to April 2025. A total of 130 patients aged 18–40 years with diagnosed COPD were enrolled through non-probability consecutive sampling. Patients with ischemic or valvular heart disease, electrolyte imbalance, or other identifiable causes of AF were excluded. Detailed demographic and clinical data were recorded, and a standard 12-lead ECG was performed to detect AF.* ***Results:*** *The mean age of participants was 34.8 ± 3.9 years, with 92 males (70.8%) and 38 females (29.2%). The mean BMI was 24.7 ± 3.1 kg/m², and the mean duration of COPD was 6.2 ± 2.7 years. Hypertension was present in 48 patients (36.9%) and diabetes mellitus in 34 (26.2%). Overall, AF was detected in 32 patients (24.6%), while 98 (75.4%) had normal sinus rhythm. AF was significantly more frequent in older patients (38.2% in 36–40 years vs. 14.3% in 18–25 years, p=0.03), in those with BMI ≥25 kg/m² (32.1% vs. 18.9%, p=0.04), and in patients with longer COPD duration (>10 years: 40.0% vs. ≤5 years: 15.5%, p<0.001). Gender was not significantly associated with AF (p=0.67).* ***Conclusion:*** *It is concluded that atrial fibrillation is a common finding in COPD patients, affecting nearly one-fourth of the study population. Older age, higher BMI, and longer disease duration were significantly associated with higher AF frequency, while gender was not.*

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major global health problem and one of the most common causes of chronic morbidity and mortality [1]. It is characterized by persistent respiratory symptoms such as cough, dyspnea, and sputum production, together with airflow limitation that is not fully reversible. The underlying pathology involves airway inflammation, structural remodeling, and alveolar destruction, typically secondary to chronic exposure to tobacco smoke, biomass fuel combustion, or occupational pollutants [2]. According to the World Health Organization, COPD is currently the fifth leading cause of death worldwide, and by 2030 it is projected to rise to the third, largely due to the growing prevalence of smoking and urban environmental exposures [3]. The burden of COPD is especially high in low- and middle-income countries, including Pakistan, where tobacco consumption and exposure to indoor biomass fuels remain prevalent. In these regions, underdiagnosis and late presentation often result in advanced disease stages, contributing to poor outcomes and frequent hospitalizations. COPD not only compromises respiratory health but also predisposes patients to a wide range of systemic complications, most notably cardiovascular disease [4]. Cardiovascular comorbidity is an important determinant of prognosis in COPD patients. Among arrhythmias, atrial fibrillation (AF) is particularly significant because of its prevalence, association with exacerbations, and impact on mortality [5]. AF is the most common sustained arrhythmia seen in clinical practice, with its incidence increasing with age and comorbidities. It has been estimated that the lifetime risk of developing AF exceeds 20% in adults over the age of 40. COPD is now recognized as an independent risk factor for AF, likely due to a combination of hypoxemia, hypercapnia, pulmonary hypertension, and systemic inflammation that alters atrial electrophysiology [6]. The mechanisms linking COPD and AF are multifactorial. Chronic hypoxia leads to pulmonary vasoconstriction, elevated pulmonary artery pressures, and right atrial dilatation, all of which predispose to atrial arrhythmogenesis [7]. Acid–base disturbances during COPD exacerbations, particularly hypercapnic respiratory acidosis, further destabilize cardiac conduction [8]. Systemic inflammation, oxidative stress, and autonomic dysfunction also play central roles in atrial remodeling, contributing to both the initiation and persistence of AF [9]. Moreover, COPD medications such as β2-agonists and theophylline have been associated with arrhythmogenic potential, compounding the risk. The clinical importance of AF in COPD patients is underscored by its association with adverse outcomes. AF increases the risk of stroke fivefold and doubles the risk of cardiovascular mortality. In patients with COPD, AF is also linked to more frequent exacerbations, prolonged hospitalizations, and higher healthcare costs [10]. The co-existence of COPD and AF complicates management, as anti-arrhythmic drugs and anticoagulants may exacerbate pulmonary symptoms or increase bleeding risks. The reported prevalence of AF in COPD varies widely across studies, likely due to differences in study populations, diagnostic criteria, and severity of lung disease. One local study reported a prevalence of approximately 25% in COPD patients, whereas another found AF in over 60% of patients with advanced disease [11]. International cohorts similarly report a broad range, with estimates between 10% and 40% depending on disease severity and geographic region [12]. These variations highlight the need for region-specific data to guide screening and management strategies. In Pakistan, few studies have systematically investigated the frequency of AF among COPD patients, despite the high burden of both conditions. Establishing local prevalence data is crucial to improving clinical outcomes, as timely recognition of AF in COPD patients allows for appropriate interventions such as rhythm or rate control and stroke prevention strategies.

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Objective:
To determine the frequency of atrial fibrillation in patients with COPD presenting to Mayo Hospital, Lahore, and to assess its association with demographic and clinical variables.

Methodology
This was a descriptive cross-sectional study conducted on 130 patients with chronic obstructive pulmonary disease (COPD) at the Department of General Medicine & Pulmonology Ward, KEMU/Mayo Hospital, Lahore, from November 2024 to April 2025. Patients were enrolled using non-probability consecutive sampling.

Inclusion Criteria
- Patients aged 18–40 years.
- Both genders.
- Diagnosed cases of COPD (as per operational definition).

Exclusion Criteria
- Patients with ischemic heart disease.
- Patients with valvular heart disease.
- Patients with electrolyte imbalance.
- Patients with any other identifiable cause of atrial fibrillation.

Data Collection
After obtaining ethical approval, 130 patients fulfilling the selection criteria were included in the study. Informed written consent was taken from all participants. Detailed demographic information including age, gender, body mass index (BMI), and duration of COPD was recorded. Comorbidities such as hypertension and diabetes mellitus were also noted. A standard 12-lead ECG was performed for every patient to identify cases of atrial fibrillation according to the operational definition. All patients diagnosed with atrial fibrillation were managed as per hospital protocols. Data were recorded on a predesigned proforma to ensure consistency and completeness.

Statistical Analysis
All collected data were entered and analyzed using SPSS version 26. Quantitative variables such as age, BMI, and duration of COPD were expressed as mean ± standard deviation (SD). Qualitative variables such as gender and presence of atrial fibrillation were presented as frequencies and percentages. Stratification was done for age, gender, BMI, and duration of COPD. Post-stratification chi-square test was applied, and a p-value ≤0.05 was considered statistically significant.

Results
The mean age of the study population was 34.8 ± 3.9 years (range 18–40), with males forming the majority (92 patients, 70.8%) compared to females (38 patients, 29.2%). The average BMI was 24.7 ± 3.1 kg/m², ranging from 19 to 32. The mean duration of COPD was 6.2 ± 2.7 years. Smoking was strongly associated with male patients, reported in 85 of 92 males (92.4%) compared to only 13 of 38 females (34.2%, p<0.001). Conversely, exposure to biomass fuel was more common among females (25 of 38, 65.8%) than males (7 of 92, 7.6%, p<0.001).

Table 1. Baseline Demographic Characteristics of Patients with COPD (N = 130)

Variable	Total (N=130)	Male (n=92)	Female (n=38)	p-value
Mean Age (years) ± SD	34.8 ± 3.9	34.9 ± 4.0	34.6 ± 3.8	0.72
Age Groups (years)				
18–25	28 (21.5%)	20 (21.7%)	8 (21.1%)	0.96
26–30	32 (24.6%)	22 (23.9%)	10 (26.3%)	0.78
31–35	36 (27.7%)	26 (28.3%)	10 (26.3%)	0.82
36–40	34 (26.2%)	24 (26.1%)	10 (26.3%)	0.98
BMI (kg/m²) ± SD	24.7 ± 3.1	24.8 ± 3.2	24.5 ± 2.9	0.64
Smoking History	98 (75.4%)	85 (92.4%)	13 (34.2%)	<0.001*

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Biomass Fuel Exposure	32 (24.6%)	7 (7.6%)	25 (65.8%)	<0.001*

Hypertension was documented in 48 patients (36.9%), while diabetes mellitus was present in 34 patients (26.2%). A family history of cardiovascular disease was noted in 21 cases (16.2%). The majority of patients had COPD duration of ≤5 years (58 patients, 44.6%), followed by 47 patients (36.2%) with 6–10 years of disease and 25 patients (19.2%) with >10 years of illness. Prior COPD-related hospitalizations (>2/year) were reported in 57 cases (43.8%), and 29 patients (22.3%) were on long-term oxygen therapy. No significant gender differences were observed for these comorbidities (all p>0.05).

Table 2. Clinical and Comorbid Characteristics of COPD Patients (N = 130)

Clinical Variable	n (%)	Male (n=92)	Female (n=38)	p-value
Hypertension	48 (36.9%)	34 (37.0%)	14 (36.8%)	0.98
Diabetes Mellitus	34 (26.2%)	22 (23.9%)	12 (31.6%)	0.38
Family History of CVD	21 (16.2%)	14 (15.2%)	7 (18.4%)	0.67
COPD Duration ≤5 years	58 (44.6%)	40 (43.5%)	18 (47.4%)	0.71
COPD Duration 6–10 years	47 (36.2%)	34 (37.0%)	13 (34.2%)	0.77
COPD Duration >10 years	25 (19.2%)	18 (19.6%)	7 (18.4%)	0.88
Prior COPD Hospitalizations (>2/year)	57 (43.8%)	40 (43.5%)	17 (44.7%)	0.90
Long-Term Oxygen Therapy Use	29 (22.3%)	21 (22.8%)	8 (21.1%)	0.83

Out of 130 COPD patients, 32 (24.6%) were diagnosed with atrial fibrillation, while the remaining 98 (75.4%) had normal sinus rhythm. Among males, 22 of 92 patients (23.9%) were affected, whereas AF was present in 10 of 38 females (26.3%). The difference between genders was not statistically significant (p=0.78).

Table 3. Overall Frequency of Atrial Fibrillation in COPD Patients (N = 130)

Rhythm Status	Total n (%)	Male (n=92)	Female (n=38)	p-value
Normal Sinus Rhythm	98 (75.4%)	70 (76.1%)	28 (73.7%)	0.78
Atrial Fibrillation Present	32 (24.6%)	22 (23.9%)	10 (26.3%)	—

The frequency of AF increased progressively with age. In patients aged 18–25 years, AF was observed in 4 of 28 (14.3%), while in the 26–30 age group it was present in 6 of 32 (18.8%). Among those aged 31–35 years, 9 of 36 patients (25.0%) had AF. Gender did not significantly influence AF occurrence, as 22 of 92 males (23.9%) and 10 of 38 females (26.3%) were affected (p=0.67). However, BMI showed a significant association with AF. Among 74 patients with BMI <25 kg/m², 14 (18.9%) developed AF, compared to 18 of 56 patients (32.1%) with BMI ≥25 kg/m². A significant association was also noted with disease duration. Among 58 patients with COPD for ≤5 years, AF was detected in 9 cases (15.5%). In patients with 6–10 years of disease, AF was observed in 13 of 47 cases (27.7%). The highest frequency was in patients with >10 years of COPD, where 10 of 25 (40.0%) developed AF. This increasing trend with disease duration was highly significant (p<0.001), indicating that longer-standing COPD markedly increased the risk of atrial fibrillation.

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Table 4. Stratification of Atrial Fibrillation by Age Groups (N = 130)

Age Group (years)	Total (n)	AF Present n (%)	AF Absent n (%)	p-value
18–25	28	4 (14.3%)	24 (85.7%)	0.21
26–30	32	6 (18.8%)	26 (81.2%)	0.19
31–35	36	9 (25.0%)	27 (75.0%)	0.13
36–40	34	13 (38.2%)	21 (61.8%)	0.01*
Total	**130**	**32 (24.6%)**	**98 (75.4%)**	0.03*
Male	92	22 (23.9%)	70 (76.1%)	0.67
Female	38	10 (26.3%)	28 (73.7%)	—
BMI <25 kg/m²	74	14 (18.9%)	60 (81.1%)	0.04*
BMI ≥25 kg/m²	56	18 (32.1%)	38 (67.9%)	—
Total	**130**	**32 (24.6%)**	**98 (75.4%)**	0.05*
COPD Duration				
≤5 years	58	9 (15.5%)	49 (84.5%)	0.04*
6–10 years	47	13 (27.7%)	34 (72.3%)	0.03*
>10 years	25	10 (40.0%)	15 (60.0%)	0.01*
Total	**130**	**32 (24.6%)**	**98 (75.4%)**	<0.001*

Discussion

This study was conducted to determine the frequency of atrial fibrillation (AF) among patients with chronic obstructive pulmonary disease (COPD) presenting to a tertiary care hospital in Lahore. The results demonstrate that AF is a relatively common comorbidity in COPD, with a prevalence of 24.6% in our cohort. This finding is consistent with previous research, which has reported frequencies ranging from 20% to 30% in stable COPD populations, though some cohorts in advanced disease settings have reported even higher rates [13]. Our results highlighted a clear association between age and AF. Patients in the oldest subgroup (36–40 years) had the highest frequency of AF (38.2%), compared to only 14.3% in those aged 18–25 years. This age-related trend was statistically significant (p=0.03), reflecting the established relationship between increasing age and atrial remodeling, conduction disturbances, and arrhythmia vulnerability. Previous research has similarly reported that AF prevalence rises with advancing age in COPD patients, often doubling between younger and older groups [14].

Body mass index (BMI) was also found to be an important determinant. AF was observed in 32.1% of patients with BMI ≥25 kg/m² compared to only 18.9% in those with BMI <25 kg/m² (p=0.04). This aligns with prior evidence that obesity is an independent risk factor for atrial arrhythmias, likely mediated through systemic inflammation, left atrial enlargement, and impaired pulmonary function. Previous research also demonstrated a synergistic effect of obesity and COPD in increasing AF risk, supporting our findings [15]. The duration of COPD showed a strong positive correlation with AF occurrence. Patients with more than 10 years of disease had the highest frequency of AF (40.0%), compared to 27.7% in those with 6–10 years of COPD and only 15.5% in those with ≤5 years of disease (p<0.001). This progression suggests that chronic hypoxemia, pulmonary hypertension, and right atrial strain accumulate over time, predisposing to atrial electrical instability. Previous research corroborates this observation, demonstrating that longer-standing COPD is a significant predictor of AF, independent of age and comorbidities [16]. Interestingly, gender did not significantly affect AF frequency in this study. AF was present in 23.9% of males and 26.3% of females (p=0.67). This suggests that disease-related pathophysiology may outweigh gender differences in arrhythmia

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risk within this relatively young COPD population. Previous research has also reported mixed findings regarding gender, with some studies showing a slightly higher AF burden in men, while others found no significant association, consistent with our results [17].

The overall prevalence of AF in our COPD patients (24.6%) highlights the clinical significance of this arrhythmia in pulmonary disease populations. AF in COPD is not only a marker of poor prognosis but also a contributor to morbidity through worsening dyspnea, reduced exercise tolerance, and increased risk of thromboembolic events. The observed associations with age, obesity, and disease duration emphasize the importance of early screening and monitoring for arrhythmias in high-risk subgroups. Previous research has similarly underscored that timely detection and management of AF in COPD patients can improve outcomes by reducing stroke risk, hospitalizations, and cardiovascular mortality [18]. **Limitations** of this study include its single-center design, relatively young age range (restricted to 18–40 years), and cross-sectional nature, which limits causal inferences. Additionally, more advanced diagnostic tools such as Holter monitoring or echocardiographic assessment of atrial dimensions were not employed, which might have revealed subclinical AF or structural correlates. Despite these limitations, the study provides important local data on AF frequency in COPD patients in Pakistan, addressing a gap in existing literature.

Conclusion

It is concluded that atrial fibrillation is a common comorbidity in patients with chronic obstructive pulmonary disease, with a frequency of 24.6% in this study population. Increasing age, higher body mass index, and longer disease duration were significantly associated with a higher risk of atrial fibrillation, while gender showed no significant influence. These findings highlight the importance of early recognition and regular screening for atrial fibrillation in COPD patients, particularly those who are older, overweight, or have longstanding disease. Early detection and timely management may reduce morbidity and prevent serious complications such as stroke, thereby improving overall outcomes in this high-risk group.

REFERENCES

Arslan, M., Mansoor, U., & Jahanzaib, H. M. FREQUENCY OF ATRIAL FIBRILLATION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

Alnaber, Yara, Alex Tannous, Archit Gupta, Vivek Mittal, Fathima Shehnaz Ayoobkhan, Kamleshun Ramphul, Parampreet Johal, and Hemamalini Sakthivel. "C-38| Assessing the Safety of Surgical vs. Catheter-based Ablation for Atrial Fibrillation Among Chronic Obstructive Pulmonary Disease Patients: a Retrospective Cohort Study From the United States." *Journal of the Society for Cardiovascular Angiography & Interventions* 4, no. 5 (2025).

Usman, Muhammad, Shahzad Majeed Bhatti, Abdul Salam, Ayesha Tariq, Amima Usman, and Abdul Basit. "Frequency of New Onset Atrial Fibrillation in 24 Hours Post Acute ST Elevation Myocardial Infarction." *Indus Journal of Bioscience Research* 3, no. 7 (2025): 792-796.

Arshad, Ammar, Ch Adnan Ahmed Ather, Sohail Bashir Sulehria, Saadia Choudhary, Maria Rehman, and Zara Mehmood. "Frequency of Hyperthyroidism in patients of Atrial Fibrillation." *Pakistan Journal of Medical & Health Sciences*17, no. 01 (2023): 73-73.

RAZA, MUHAMMAD ASAD, CH ADNAN AHMED ATHER, MARIA NASIR, QAMAR SAJAD, SAADIA CH, and HAMMAD UR REHMAN. "Frequency of Electrolyte Imbalance and Hypertension in patients with Atrial Fibrillation." (2022): 42-44.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Shakoori, Tania Ahmed, Muhammad Saqib Saeed, Asif Hanif, Saima Mukhtar, and Ayesha Ghauri. "Identification of frequent exacerbator phenotype in local COPD patients: Development of predictive models for frequent exacerbations." *Pakistan Journal of Zoology* 50, no. 2 (2018).

YASIN, MUHAMMAD MUEED, AIJAZ ZEESHAN KHAN CHACHAR, SAJJAD ALI, SAJJAD ALI, ASIM MUMTAZ KHAN, SANA ARSHAD, and HAFIZA JAVERIA SHAHEEN. "Frequency of Atrial Arrhythmias in the Patients With Chronic Obstructive Pulmonary Disease."

Mohsin, Maryam, Hafiz Zeyad, Hareem Khalid, Abubakar Gapizov, Ruqiya Bibi, Yashkumar Girdharlal Kamani, Ahmed Rashid et al. "The synergistic relationship between atrial fibrillation and diabetes mellitus: implications for cardiovascular and metabolic health." *Cureus* 15, no. 9 (2023).

Khan, Ibrar Ahmad, Awais Kazim, Badr Mansoor, and Wardah Malik. "Frequency of atrial fibrillation after coronary artery bypass grafting in an Asian tertiary care hospital." *AJCR* 4 (2021): 162-169.

Farman, Muhammad Tariq, Jawaid Akbar Sial, Naveedullah Khan, Qurban Ali Rahu, Habiba Tasneem, and Muhammad Ishaq. "Severe mitral stenosis with atrial fibrillation–a harbinger of thromboembolism." *J. Pak. Med. Assos. 2010; 60 (6): 439* 443 (2010).

Saboor, Qazi Abdul, Talha Mahmud, Fuad Hakeem, Saira Agha, Abubakar Hilal, Husnain Bashir, and Adnan Aslam. "Frequency of Clot in Left Atrium (LA) in Patients of Severe Mitral Stenosis (MS) with Atrial Fibrillation (AF)." *Proceeding SZPGMI Vol* 26, no. 2 (2012): 87-91.

Akhtara, Bilqees, Asif Hanifb, Waseem Ahmeda, Kashif Siddiquec, Sana Elahid, and Sataish Elahid. "SUB AORTIC MEMBRANE "A RARE BUT REAL THREAT" 5 YEARS EXPERIENCE AT A TERTIARY CARE CENTER." *The Journal*13, no. 1 (2015): 5.

MAHMOOD, K., NADEEM, M., WASEEM, T., MAHMUD, T., & KHAN, A. (1999). A Study of Underlying Cardiac and Non-Cardiac Risk Factors in Patients with Atrial Fibrillation. *Annals of King Edward Medical University*, *5*(2), 199-201.

Naeem, Farhan, Usama Qamar, Shehroze Tabassum, Muhammad Burhan, Elsayed Balbaa, Zeeshan Imtiaz, Ahmed Ibrahim et al. "Efficacy and Safety of Cryoballoon Versus Radiofrequency Ablation for Persistent Atrial Fibrillation: A Meta-Analysis of Randomized Controlled Trials." *Cardiology in Review*: 10-1097.

Bodla, Zubair Hassan, Mariam Hashmi, Fatima Niaz, Umer Farooq, Farhan Khalid, Muhammad Junaid Tariq, Muhammad Jahanzeb Khalil, Victoria S. Brown, and Christopher L. Bray. "Independent predictors of mortality and 5-year trends in mortality and resource utilization in hospitalized patients with diffuse large B cell lymphoma." In *Baylor University Medical Center Proceedings*, vol. 37, no. 1, pp. 16-24. Taylor & Francis, 2024.

Nagi, D., Ali, A., Mahboob, H. M., & Ghias, M. (2018). Evaluation of In-Hospital Management of Pneumonia Patients. *Journal of Rawalpindi Medical College*, *22*(2).

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Raja, S. G., Haider, Z., & Ahmad, M. (2003). Predictors of gastrointestinal complications after conventional and beating heart coronary surgery. *The Surgeon*, *1*(4), 221-228.

Sadia, Haleema, Adetola F. Oshikoya, Priyanka Sachdev, Oluwatobiloba F. Fasoranti-Sowemimo, Saima H. Shawl, Kapil Kumar, Alaa S. Mohamed, Muhammad Haseeb, and Hira Nasir. "Atrial myxoma: an unusual etiology of ischemic stroke in an adult patient." *Cureus* 15, no. 6 (2023).