Original Article

OPEN ACCESS

Frequency of Atrial Fibrillation in Patients of Heart Failure with Reduced Ejection Fraction

Shayan Khan[1], Fazlul Aziz Mian[2], Shahab Saidullah[3], Ayesha Tariq[4]

[1]Post Graduate Resident, [2]Professor of Cardiology, [3]Associate Professor, [4] Ex Postgraduate trainee

[1,2,3]Dept. of Cardiology, Pakistan Institute of Medical Sciences, Islamabad

[4]Currently working Medical officer CMH Rawlakot, AJK

Author`s Contribution

[1,4]Substantial contributions to the conception or design of the work; or the acquisition, Drafting the work or revising it critically for important intellectual content [3]Final approval. [2]Active participation in active methodology, analysis, or interpretation of data for the work

Funding Source: None

Conflict of Interest: None

Received: Mar 28, 2026

Revised: April 19, 2026

Accepted: April 28, 2026

Address of Correspondent

Dr Shayan Khan

Post Graduate Resident

Dept. of Cardiology, Pakistan Institute of Medical Sciences, Islamabad

shayanwazir444@gmail.com

ABSTRACT

Objective: To determine the frequency of atrial fibrillation in patients of heart failure with reduced ejection fraction(HFrEF).

Methodology: This cross sectional study was carried out at the department of cardiology, PIMS hospital, Islamabad from Sep 2025 till March 2026. A total of 258 male and female patients in the age range 20 to 80 years diagnosed with heart failure with ejection fraction less than 40.0% were enrolled. The patients were evaluated for the presence of atrial fibrillation through clinical examination and ECG findings. Data analysis was carried out using SPSS v. 26.

Results: The mean age of the participants was 48.85±12.16 years. Participants aging more than 50 years were 122 (47.3%) while 214 patients (82.9%) were male. Diabetes mellitus was present in 46 patients (17.8%) while NYHA class IV was recorded in 202 patients (78.3%). Atrial fibrillation was recorded in 29 patients (11.2%). No statistically significant association was recorded between atrial fibrillation and baseline clinico-demographic parameters (p value >0.05).

Conclusion: The frequency of atrial fibrillation in this cohort of HFrEF patients was lower than that reported in global studies, probably due to younger age distribution of the study population. These results highlight the variability in the association between atrial fibrillation and HFrEF and emphasize the importance of regional data for accurate assessment and treatment strategies.

Key words: Atrial Fibrillation, Heart Failure, Reduced Ejection Fraction

Cite this article as: KhanSm Mian FZ, Saidullah S, Tariq A. Frequency of Atrial Fibrillation in Patients of Heart Failure with Reduced Ejection Fraction. Ann Pak Inst Med Sci. 2026; 22(2):200-204. doi. 10.48036/apims.v22i2.1629.

Introduction

Atrial fibrillation (AF) is a relatively prevalent disorder of the heart is gradually rising in numerous emerging nations. AF is linked to higher rates of morbidity and death. One of the main warning signs for atrial fibrillation is advancing age. The overall lifespan has grown, and the process of aging has been delayed by ongoing therapeutic and medical improvements, including surgical operations, medicinal treatments, and public healthcare programs.[1]

Progressive age-related conditions including atrial fibrillation have grown in frequency because of this longer lifetime. By 2050, it is anticipated that twelve to fifteen million Americans would suffer with atrial fibrillation, as the condition's prevalence and incidence continue to rise globally. Coronary artery disease, hypertension, diabetes mellitus, obesity, alcoholism, and tobacco use are all recognized as potential causes for atrial fibrillation.[2]

Heart failure (HF) represents a serious and expanding health issue worldwide. It is uncertain how common heart failure occurs in this region of South Asia. Only a small number of estimations depend on epidemiological data from Western countries.[3] Even in underdeveloped nations, there have been no population-centered HF investigations. The absence of comparable evidence beyond the USA and Europe is mentioned in AHA heart failure prevention statement.[4]

In healthcare settings, atrial fibrillation (AF) and heart failure frequently exists together, and the number of cases with HF accompanied by AF is steadily rising. During the pathological process, HF and AF promote and impact

each other, resulting in an endless cycle. Catheter ablation has become a novel treatment modality for HF made worse by AF due to its advantages in rhythm stabilization, cardiac performance enhancement, and a favorable long-term outlook.[5]

Epidemiological data suggests that 25% of those admitted to hospitals with heart failure come with atrial fibrillation.[6] 52 individuals (21.1%) having heart failure were identified to have atrial fibrillation in research by Haleem et al. Most AF patients (96.2%) were between the ages of 40 and 70 years.[7]

Mortality and morbidity are affected when atrial fibrillation occurs in heart failure patients. Therefore, understanding the burden of atrial fibrillation in heart failure patients was essential. A comprehensive review of the literature indicates that there was a dearth of information about AF in heart failure in the local community, with the majority of the information coming from research conducted elsewhere, the results of which cannot be generalized due to demographic and clinical variations. The inability to generalize the findings of foreign investigations creates a knowledge gap. The study was planned as a result. The study aimed to determine the frequency of atrial fibrillation in patients of heart failure with reduced ejection fraction in our population.

Methodology

This cross sectional study was carried out at the department of Cardiology, PIMS hospital, Islamabad during from Sept 2025 till March 2026. Male and female patients in the age range 20 to 80 years diagnosed with heart failure (NYHA class III and IV) with reduced ejection fraction were enrolled. Patients with valvular heart disease, history of hyperthyroidism and advanced systemic disease like pulmonary, renal or hepatic disease and malignancy were excluded. Heart failure with reduced ejection fraction was diagnosed when patient complained of fatigue (numerical fatigue rating scale>3) and dyspnea (mRC dyspnea scale 2 and above) and echocardiography revealing ejection fraction <40.0%. Patients were further categorized based on NYHA classification as: Class I (no physical activity limitation, Class II (slight physical activity limitation – dyspnea on ordinary activity), Class III (Marked physical activity limitation – dyspnea on mild physical activity) and Class IV (dyspnea at rest). Atrial fibrillation was diagnosed on clinical findings (irregularly irregular pulse) and ECG showing absence of p waves and narrow QRS complexes will be considered confirmatory for the presence of atrial fibrillation. Sample size was 258, calculated using WHO sample size calculator taking anticipated proportion of AF in heart failure with reduced ejection fraction as 21.3%[7], 5% margin of error and 95% confidence level.

Patients who meet the selection requirements were recruited from the institute's inpatient division of cardiology after receiving clearance from the hospital's research evaluation committee and CPSP. All registered participants were explicit of the study's goals, risks, and advantages before giving their informed permission. The following baseline data was recorded: age (years), gender (male/female), BMI (weight in kilograms/height in meters2), length of heart failure (months), NYHA class (I, II, III, IV), comorbidities (diabetes (FBS>130 mg/dl), hypertension (BP >140/80 mmHg), residence, education, and SE status. For atrial fibrillation, physical examination was performed. The rate and rhythm was recorded. This was followed by standard 12 lead ECG. The limb lead II was selected in all patients for assessment of rate and rhythm. The ECG was read by consultant cardiologist. Presence of atrial fibrillation was noted as per operational definitions.

Data analysis was carried out using SPSS version 26. Continuous data like age, BMI and ejection fraction was reported as means ± SD or median IQR after data normality check with Shapiro wilk test while categorical data was reported as frequencies and percentages reported for categorical data like gender, NYHA class, comorbidities (DM,HTN) and presence/absence of atrial fibrillation. Atrial fibrillation was stratified by age, gender, BMI, diabetes mellitus, hypertension and NYHA class. Post stratification chi square test was applied at 5% level of significance.

Results

The mean age of the participants was 48.85±12.16 years. Participants aging more than 50 years were 122 (47.3%) while 214 patients (82.9%) were male. BMI more than 24.0kg/m^2 was recorded in 220 patients (85.3%). Diabetes mellitus was observed in 46 patients (17.8%) while NYHA class IV was recorded in 202 patients (78.3%) as reported in table I.

Table I: Baseline characteristics of study participants. (n = 258)

		N	%
Age (years) 48.85±12.16	50 or below	136	52.7
	Above 50	122	47.3
Gender	Male	214	82.9
	Female	44	17.1

BMI (kg/m^2) 24.30 ± 1.03	24.0 or below	38	14.7
	above 24.0	220	85.3
Diabetes mellitus	Yes	46	17.8
	No	212	82.2
Hypertension	Yes	34	13.2
	No	224	86.8
NYHA class	III	56	21.7
	IV	202	78.3

Atrial fibrillation was recorded in 29 patients (11.2%) as reported in figure 1.

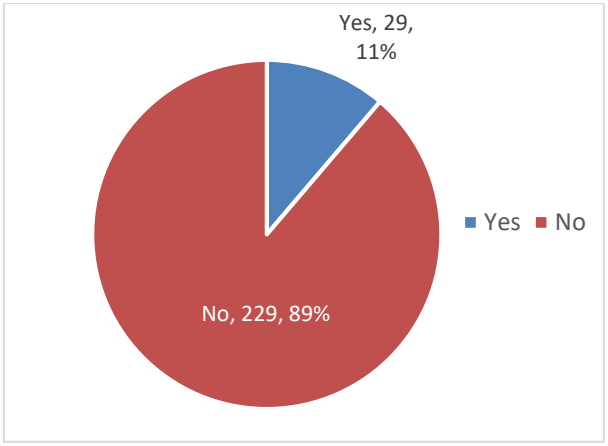

Figure 1. Atrial Fibrillation among HF patients with reduced ejection fraction.

Age-wise distribution showed that 19 patients (14.0%) with atrial fibrillation had age 50 years or below. However, the p value for difference in distribution was 0.143. Atrial fibrillation was recorded in 27 (12.6%) male participants versus 02 (4.5%) female patients, p value 0.123. The p values for difference in distribution of atrial fibrillation with respect to diabetes and hypertension were 0.669 and 0.917 respectively. Among patients with NYHA class IV heart failure, atrial fibrillation was recorded in 23 patients (11.4%), p value 0.888 as reported in table II.

Table II: Subgroup analysis of atrial fibrillation with baseline parameters. (n = 258)

		Atrial fibrillation		Total	Chi square p value
		Yes (n = 29)	No (n = 229)		
Age (years)	50 or below	19	117	136	0.143
		14.0%	86.0%	100.0%	
	Above 50	10	112	122	
		8.2%	91.8%	100.0%	
Gender	Male	27	187	214	0.123
		12.6%	87.4%	100.0%	
	Female	2	42	44	
		4.5%	95.5%	100.0%	
BMI (kg/m^2)	24.0 or below	6	32	38	0.336
		15.8%	84.2%	100.0%	
	Above 24.0	23	197	220	
		10.5%	89.5%	100.0%	
Diabetes mellitus	Yes	6	40	46	0.669
		13.0%	87.0%	100.0%	
	No	23	189	212	
		10.8%	89.2%	100.0%	
HTN	Yes	4	30	34	0.917
		11.8%	88.2%	100.0%	
	No	25	199	224	
		11.2%	88.8%	100.0%	
NYHA class	III	6	50	56	0.888
		10.7%	89.3%	100.0%	
	IV	23	179	202	
		11.4%	88.6%	100.0%	

Discussion

The purpose of this study was to ascertain the prevalence of atrial fibrillation (AF) in a group of individuals suffering from heart failure with reduced ejection fraction (HFrEF). The primary finding was that 11.2% of the 258 research participants had AF. Given that the co-occurrence of AF and HFrEF is known to impair prognosis, complicate care, and raise the risks of stroke, hospitalization, and death, this incidence is an important piece of epidemiological data.[8]

The statistic reported in several large worldwide HFrEF registries and studies, which frequently mention rates between 25 and 40%, is significantly higher than the observed AF incidence of 11.2% in our group.[9,10] For example, the prevalence of AF in HFrEF patients was about 22% in the ASIAN-HF registry, encompassing patients from all throughout Asia.[11] This disparity might be explained by several characteristics unique to the research cohort. With a large percentage of men (82.9%) and a significant burden of more severe symptoms (78.3% in NYHA class IV). One recognized protective factor against AF, which is more common in elderly people, is the younger age, which was more prevalent in our study cohort.[12] Therefore, compared to studies with older individuals, the decreased overall prevalence of AF is probably mostly due to the younger demographic composition of our sample. Additionally, our study's single-center design may represent regional variations in heart disease etiology and demographics compared to global registries.

There was no statistically significant correlation between AF and common clinical and demographic factors, according to our subgroup analysis. Despite a numerical trend (14.0% AF in age ≤50 vs. 8.2% in >50), the lack of

substantial association with age was surprising and goes against the extensive epidemiological data that establishes age as the biggest independent risk factor for AF.[12] This might be because our group is often young, which narrows the range and reduces the ability to identify an age impact. Similarly, although though AF is often more prevalent in males, the lower number of female participants may have contributed to our discovery of a non-significant gender difference.[13]

It's especially intriguing that there is no significant link to NYHA class IV. It implies that, in contrast to the pathophysiological knowledge that advanced hemodynamic strain and neurohormonal stimulation promote atrial remodeling, the intensity of heart failure manifestations may not be the major driver of AF development in this, younger HFrEF cohort.[14] Other characteristics that were not included in our study may be more important, such as the fundamental cause of cardiomyopathy (e.g., a high incidence of idiopathic or valvular causes in our environment).

There are a few restrictions to be mentioned. The cross-sectional design shows an association between HFrEF and AF but not a cause-and-effect relationship. Generalizability is restricted by the single-center design. Prevalence rates are greatly influenced by the technique of AF identification, whether it is based on a single ECG, a history, or continuous monitoring; studies that use prolonged monitoring indicate greater AF rates than those that depend on regular ECGs.[15] This data is essential for understanding our findings. Furthermore, data on significant confounders that could affect both the prevalence of AF and the observed associations were not examined, including the etiology of HFrEF, left atrial size, renal function, and medication use (particularly beta-blockers or antiarrhythmics).

Conclusion

The frequency of atrial fibrillation in this relatively young cohort of HFrEF patients was lower than global reports. No significant relationships were identified between AF and prevalent risk variables such as advanced NYHA class, hypertension, or older age in this population. These results highlight the variability in the association between atrial fibrillation and HFrEF and emphasize the importance of regional data for accurate assessment and treatment strategies. Future prospective studies including extended rhythm monitoring and thorough etiological profiling are necessary to better understand the causes and effects of AF in younger HFrEF populations.

References

1. Ullah R, Shiraz A, Bahadur S, Shireen F. Frequency of atrial fibrillation in patients presenting with decompensated heart failure. Cureus. 2021;13(12):e20594. https://doi.org/10.7759/cureus.20594
2. Kiuchi K, Shirakabe A, Kobayashi N, Okazaki H, Matsushita M, Shibata Y, et al. Prognostic impact of new-onset atrial fibrillation associated with worsening heart failure in aging patients with severely decompensated acute heart failure. Int J Cardiol. 2020;302:88–94. https://doi.org/10.1016/j.ijcard.2019.09.020
3. Iwahashi N, Takahashi H, Abe T, Okada K, Akiyama E, Matsuzawa Y, et al. Urgent control of rapid atrial fibrillation by landiolol in patients with acute decompensated heart failure with severely reduced ejection fraction. Circ Rep. 2019;1(10):422–30. https://doi.org/10.1253/circrep.CR-19-0076
4. Jobs A, Schwind J, Katalinic A, Babaev V, Tilz RR, Rausch S, et al. Prognostic significance of atrial fibrillation in acute decompensated heart failure with reduced versus preserved ejection fraction. Clin Res Cardiol. 2019;108(1):74–82. https://doi.org/10.1007/s00392-018-1321-4
5. Kocabaş U, Sinan ÜY, Aruğaslan E, Kurşun M, Çoner A, Özcan Çelebi Ö, et al. Clinical characteristics and in-hospital outcomes of acute decompensated heart failure patients with and without atrial fibrillation. Anatol J Cardiol. 2020;23(5):260–7. https://doi.org/10.14744/AnatolJCardiol.2020.94884
6. Hirai K, Kawakami R, Nogi M, Ishihara S, Hashimoto Y, Nakada Y, et al. Impact of atrial fibrillation on the prognosis of acute decompensated heart failure with and without mitral regurgitation. Circ Rep. 2021;3(7):388–95. https://doi.org/10.1253/circrep.CR-21-0027
7. Haleem SM, Kalwar MH, Butt MH, Hasan J, Sheikh JK, Shah JA. Frequency of atrial fibrillation in heart failure patients. Pak J Med Health Sci. 2021;15(11):3261–4. https://doi.org/10.53350/pjmhs2115113261
8. Santhanakrishnan R, Wang N, Larson MG, Magnani JW, McManus DD, Lubitz SA, et al. Atrial fibrillation begets heart failure and vice versa: temporal associations and differences in preserved versus reduced ejection fraction. Circulation. 2016;133(5):484–92. https://doi.org/10.1161/CIRCULATIONAHA.115.018614
9. McMurray JJV, Ezekowitz JA, Lewis BS, Gersh BJ, van Diepen S, Amerena J, et al. Left ventricular systolic dysfunction, heart failure, and risk of stroke and systemic embolism in patients with atrial fibrillation: insights from the ARISTOTLE trial. Circ Heart Fail. 2013;6(3):451–60. https://doi.org/10.1161/CIRCHEARTFAILURE.112.000143
10. Kotecha D, Lam CSP, van Veldhuisen DJ, van Gelder IC, Voors AA, Rienstra M. Heart failure with preserved

ejection fraction and atrial fibrillation: vicious twins. J Am Coll Cardiol. 2016;68(20):2217–28. https://doi.org/10.1016/j.jacc.2016.08.048

11. Lam CSP, Teng TK, Tay WT, Anand I, Zhang S, Shimizu W, et al. Regional and ethnic differences among patients with heart failure in Asia: the Asian sudden cardiac death in heart failure registry. Eur Heart J. 2016;37(41):3141–53. https://doi.org/10.1093/eurheartj/ehw331
12. Staerk L, Sherer JA, Ko D, Benjamin EJ, Helm RH. Atrial fibrillation: epidemiology, pathophysiology, and clinical outcomes. Circ Res. 2017;120(9):1501–17. https://doi.org/10.1161/CIRCRESAHA.117.309732
13. Ko D, Rahman F, Schnabel RB, Yin X, Benjamin EJ, Christophersen IE. Atrial fibrillation in women: epidemiology, pathophysiology, presentation, and prognosis. Nat Rev Cardiol. 2016;13(6):321–32. https://doi.org/10.1038/nrcardio.2016.45
14. Andrade J, Khairy P, Dobrev D, Nattel S. The clinical profile and pathophysiology of atrial fibrillation: relationships among clinical features, epidemiology, and mechanisms. Circ Res. 2014;114(9):1453–68. https://doi.org/10.1161/CIRCRESAHA.114.303211
15. Diederichsen SZ, Haugan KJ, Køber L, Højberg S, Brandes A, Kronborg C, et al. Atrial fibrillation detected by continuous electrocardiographic monitoring using implantable loop recorder to prevent stroke in individuals at risk (the LOOP study): rationale and design of a randomized controlled trial. Am Heart J. 2017;187:122–32. https://doi.org/10.1016/j.ahj.2017.02.017
16.