



Original Article

Clinical and Echocardiographic Profile of Patients with Atrial Fibrillation: A Cross-Sectional Study

Dr. Shravan Kumar D¹, Dr. Darna Arun Kumar²

^{1,2}Assistant Professor, Department of General Medicine, Prathima Relief Institute of Medical Sciences, Hanamkonda, Telangana, India.

OPEN ACCESS

Corresponding Author:

Dr. Shravan Kumar D

Assistant Professor, Department of
General Medicine, Prathima Relief
Institute of Medical Sciences,
Hanamkonda, Telangana, India.

Received: 10-09-2025

Accepted: 22-10-2025

Available online: 30-10-2025

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Medical and Pharmaceutical Research

ABSTRACT

Background: Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia encountered in clinical practice and is associated with significant morbidity and mortality due to stroke, heart failure, and thromboembolic complications. Echocardiography plays a crucial role in identifying structural cardiac abnormalities associated with AF and aids in clinical management. This study was designed to evaluate the clinical characteristics and echocardiographic profile of patients with atrial fibrillation attending a tertiary care teaching hospital.

Materials and Methods: This hospital-based cross-sectional study consists a total of 146 patients aged 18 years and above with electrocardiographically confirmed atrial fibrillation were enrolled. Detailed demographic data, clinical presentation, associated comorbidities, electrocardiographic findings, and echocardiographic parameters were recorded and analyzed.

Results: The mean age of the study population was 63.4±12.8 years, with males constituting 56.2% of cases. The majority of patients belonged to the 60–69 years age group (30.1%). Palpitations (80.8%) and dyspnea (65.8%) were the most common presenting symptoms. Hypertension was the predominant comorbidity (57.5%), followed by rheumatic heart disease (35.6%) and diabetes mellitus (32.9%). Echocardiographic evaluation revealed left atrial enlargement in 74.0% of patients, mitral regurgitation in 53.4%, tricuspid regurgitation in 42.5%, left ventricular hypertrophy in 38.4%, and reduced left ventricular ejection fraction in 31.5%. Hypertensive heart disease (30.1%) and rheumatic heart disease (27.4%) were the leading etiological factors. A significant association was observed between left atrial enlargement and heart failure (p=0.003).

Conclusion: Atrial fibrillation predominantly affects elderly individuals and is commonly associated with hypertension and structural heart disease. Left atrial enlargement was the most frequent echocardiographic abnormality. Comprehensive echocardiographic assessment is essential for identifying underlying cardiac pathology, guiding management, and improving clinical outcomes in patients with atrial fibrillation.

Keywords Atrial fibrillation, Echocardiography, Left atrial enlargement, Hypertension, Rheumatic heart disease, Cardiac arrhythmia.

INTRODUCTION

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia encountered in clinical practice and represents a major public health concern worldwide. It is characterized by disorganized atrial electrical activity resulting in ineffective atrial contraction and an irregularly irregular ventricular response. The prevalence of AF increases significantly with advancing age, affecting less than 1% of individuals younger than 60 years and more than 10% of those older than 80 years. Owing to increasing life expectancy and the growing burden of cardiovascular risk factors, the incidence and prevalence of AF continue to rise globally, making it a major contributor to cardiovascular morbidity and mortality (1,2). Atrial fibrillation is associated with substantial clinical consequences, including stroke, systemic thromboembolism, heart failure, cognitive decline, recurrent hospitalizations, and reduced quality of life. Patients with AF have a nearly five-fold

increased risk of ischemic stroke and a two-fold increase in all-cause mortality compared to individuals in normal sinus rhythm (3). The arrhythmia may present with a wide spectrum of symptoms ranging from palpitations, dyspnea, chest discomfort, fatigue, dizziness, and syncope to asymptomatic episodes detected incidentally during routine examinations (4).

The etiology of AF is multifactorial and includes hypertension, rheumatic heart disease, ischemic heart disease, cardiomyopathies, valvular heart disease, diabetes mellitus, obesity, chronic kidney disease, and thyroid dysfunction (5). In developing countries such as India, rheumatic valvular heart disease remains an important cause of AF, whereas hypertension and ischemic heart disease predominate in developed nations (6). Identification of the underlying cardiac pathology is essential for risk stratification and therapeutic decision-making.

Echocardiography plays a pivotal role in the evaluation of patients with AF. It provides valuable information regarding chamber dimensions, left ventricular systolic function, valvular abnormalities, pulmonary artery pressures, and the presence of structural heart disease. Left atrial enlargement, left ventricular dysfunction, mitral valve disease, and pulmonary hypertension are frequently observed echocardiographic abnormalities in AF patients and may influence prognosis and treatment outcomes (7,8).

Although AF is increasingly recognized in clinical practice, data regarding its clinical characteristics and echocardiographic profile in the Indian population remain limited, particularly from tertiary care centres in Telangana. Understanding the demographic characteristics, clinical presentation, associated comorbidities, and echocardiographic abnormalities among patients with AF can facilitate early diagnosis, optimize management strategies, and improve patient outcomes. Therefore, the present study was undertaken to evaluate the clinical and echocardiographic profile of patients with atrial fibrillation.

MATERIALS AND METHODS

This hospital based cross-sectional study was conducted in the Department of General Medicine at Prathima Relief Institute of Medical Sciences, Hanamkonda, Telangana, India from August 2024 to August 2025. A total of 146 patients presenting with electrocardiographically confirmed atrial fibrillation (AF) who were attended and admitted to the department wards, and intensive care units, during the study period were recruited. Written informed consent was obtained from all the study participants and study protocol was approved by the institutional ethics committee.

Inclusion Criteria: Patients aged ≥ 18 years, electrocardiographically confirmed atrial fibrillation, newly diagnosed and known cases of atrial fibrillation and willing to participate and provide informed written consent.

Exclusion Criteria: Patients aged < 18 years, with incomplete clinical data, incomplete echocardiographic data, unwilling to provide informed consent, and cases with poor echocardiographic windows precluding adequate cardiac assessment

A detailed clinical history was obtained from each participant using a predesigned patient proforma. Demographic characteristics including presenting symptoms, duration of illness, past medical history, comorbid conditions, medication history, and risk factors for atrial fibrillation was recorded. All participants underwent comprehensive physical examination, routine laboratory investigations and radiological evaluation. A comprehensive transthoracic echocardiographic examination using a standardized echocardiography system with phased-array transducers. Echocardiography was performed by experienced specialist following recommendations of the American Society of Echocardiography.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS v.25.0. Continuous variables were expressed as mean and standard deviation (SD). Categorical variables were presented as frequencies and percentages. Comparisons between groups were performed using independent Student's t-test for continuous variables and Chi-square test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1. Demographic and clinical characteristics of study participants.

Variable	Total cases (n=146)	
	Frequency	Percentage
Age Group (years)		
<40	12	8.2%
40-49	18	12.3%
50-59	32	21.9%
60-69	44	30.1%

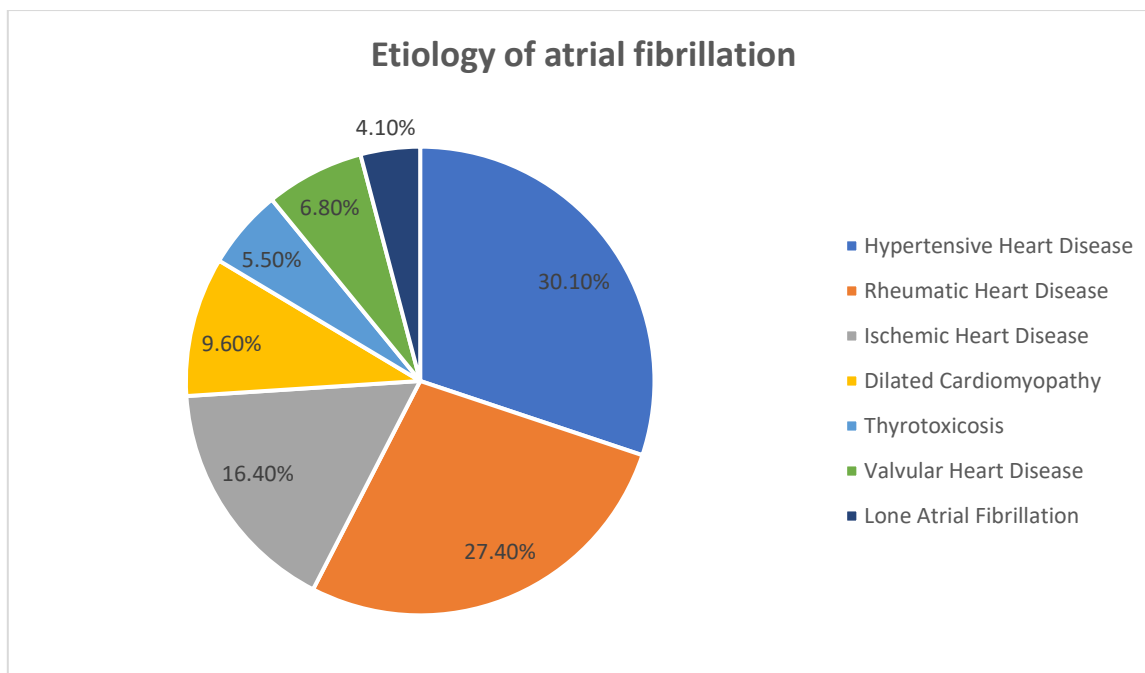
≥70	40	27.4%
Gender		
Male	82	56.2%
Female	64	43.8%
Clinical symptoms		
Palpitations	118	80.8%
Dyspnea	96	65.8%
Fatigue	72	49.3%
Chest pain	40	27.4%
Pedal edema	38	26%
Dizziness	26	17.8%
Syncope	14	9.6%
Stroke/TIA symptoms	18	12.3%
Associated comorbidities		
Hypertension	84	57.5%
Rheumatic heart disease	52	35.6%
Diabetes mellitus	48	32.9%
Coronary artery disease	34	23.3%
Heart failure	42	28.8%
Thyroid disorders	12	8.2%
Chronic kidney disease	10	6.8%

Table 2: ECG characteristics.

ECG Finding	Frequency	Percentage
Rapid Ventricular Rate (>100 bpm)	78	53.4%
Controlled Ventricular Rate	68	46.6%
Left Ventricular Hypertrophy	44	30.1%
Ischemic Changes	30	20.5%
Bundle Branch Block	16	11%
Mean ventricular rate	108.7 ± 24.5 bpm	

Table 3: Echocardiographic findings.

Echocardiographic Parameter	Frequency	Percentage
Left Atrial Enlargement	108	74%
Right Atrial Enlargement	42	28.8%
Left Ventricular Hypertrophy	56	38.4%
Reduced LVEF (<50%)	46	31.5%
Pulmonary Hypertension	40	27.4%
Mitral Regurgitation	78	53.4%
Tricuspid Regurgitation	62	42.5%
Aortic Valve Disease	24	16.4%
Intracardiac Thrombus	8	5.5%
Pericardial Effusion	6	4.1%



Graph 1: Etiology of atrial fibrillation.

Table 4: Association between left atrial enlargement and heart failure.

Left atrial enlargement	Heart failure		Chi-square value	p-value
	present	absent		
Present	38	70	8.74	0.003
Absent	4	34		

Table 5: Left ventricular ejection fraction categories.

LVEF Category	Frequency (n)	Percentage (%)
≥55%	84	57.5%
40–54%	36	24.7%
30–39%	18	12.3%
<30%	8	5.5%
Mean LVEF	53.2 ± 11.4	

DISCUSSION

The mean age of the patients was 63.4 ± 12.8 years, with the majority of cases occurring in individuals aged 60 years and above. These findings are consistent with previous epidemiological studies demonstrating that the prevalence of AF increases progressively with age due to age-related structural and electrical remodelling of the atria (1,2). Chugh et al. reported that AF predominantly affects older adults and is becoming increasingly common as life expectancy increases worldwide (2). Similarly, the Framingham Heart Study identified advanced age as one of the strongest predictors for the development of AF (3).

A male predominance was observed in the current study, with males accounting for 56.2% of cases. This observation is comparable to findings reported by Benjamin et al., who demonstrated a higher incidence of AF among men despite the substantial disease burden among women (4). The gender differences may be attributed to variations in cardiovascular risk factors, hormonal influences, and structural cardiac remodelling.

Palpitations and dyspnea were the most common presenting symptoms in the present study, observed in 80.8% and 65.8% of patients, respectively. Similar symptom profiles have been reported in previous studies, where palpitations, exertional breathlessness, fatigue, and chest discomfort were the predominant manifestations of AF (5). The high prevalence of dyspnea may reflect the coexistence of heart failure, valvular heart disease, and impaired ventricular function among affected individuals.

Hypertension emerged as the most frequent comorbidity, affecting 57.5% of patients. This finding is consistent with international and Indian studies that identify hypertension as the leading risk factor for AF (6,7). Chronic pressure overload resulting from hypertension contributes to left ventricular hypertrophy, diastolic dysfunction, atrial enlargement, and subsequent development of atrial fibrillation. Rheumatic heart disease (35.6%) was the second most common

comorbidity in our study. Although the prevalence of rheumatic heart disease has declined in developed countries, it continues to represent an important etiological factor for AF in developing nations, including India (8).

Echocardiographic evaluation revealed left atrial enlargement in 74.0% of patients, making it the most common structural abnormality identified. Left atrial enlargement is widely recognized as both a consequence and a predictor of AF. Enlargement of the left atrium promotes electrical heterogeneity and re-entry circuits, thereby facilitating the persistence of arrhythmia (9). Similar observations were reported by Thomas L and Abhayaratna WP, who highlighted the strong association between left atrial size and AF burden (10).

Mitral regurgitation was present in 53.4% of patients, while tricuspid regurgitation was observed in 42.5%. These findings are consistent with previous reports demonstrating a high prevalence of valvular abnormalities among patients with AF, particularly in populations with underlying rheumatic heart disease (11). Valvular lesions increase atrial pressure and volume overload, contributing to atrial remodelling and arrhythmogenesis.

Reduced left ventricular ejection fraction was observed in 31.5% of patients. Left ventricular systolic dysfunction has been shown to coexist frequently with AF, with each condition predisposing to the development and progression of the other (12). The coexistence of AF and heart failure results in a complex pathophysiological interaction that adversely affects clinical outcomes. In our study, heart failure was present in 28.8% of patients, further emphasizing this association.

The etiological analysis revealed hypertensive heart disease as the most common underlying cause of AF, followed by rheumatic heart disease and ischemic heart disease. These findings are in agreement with contemporary Indian studies that demonstrate an epidemiological transition from predominantly rheumatic etiologies to hypertension-related AF while retaining a substantial burden of valvular disease (13). This changing pattern reflects improved control of rheumatic fever in some regions and increasing prevalence of hypertension, diabetes mellitus, and coronary artery disease.

An important observation in the present study was the significant association between left atrial enlargement and heart failure ($p = 0.003$). This finding supports previous evidence suggesting that atrial remodelling and ventricular dysfunction are closely interconnected processes that contribute to disease progression and adverse cardiovascular outcomes (14).

The present study highlights the critical role of echocardiography in identifying structural cardiac abnormalities among patients with AF. Comprehensive echocardiographic assessment enables accurate characterization of underlying heart disease, risk stratification, and therapeutic planning. Early recognition and management of modifiable risk factors such as hypertension, diabetes, and valvular heart disease may help reduce the burden of AF-related complications.

CONCLUSION

Atrial fibrillation is a common cardiac arrhythmia predominantly affecting older adults and is frequently associated with hypertension, rheumatic heart disease, and other cardiovascular comorbidities. In the present study, palpitations and dyspnea were the most common clinical presentations, while left atrial enlargement emerged as the predominant echocardiographic abnormality. Echocardiography proved valuable in identifying structural heart disease, valvular lesions, and ventricular dysfunction underlying atrial fibrillation. Early detection of associated risk factors and comprehensive echocardiographic evaluation can facilitate timely intervention, improve risk stratification, guide therapeutic decisions, and potentially reduce the burden of AF-related complications and adverse cardiovascular outcomes.

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