



Original Research Article

CLINICAL AND ETIOLOGICAL PROFILE OF ATRIAL FIBRILLATION AND ITS TRANSTHORACIC ECHOCARDIOGRAPHIC PRESENTATION: A CROSS-SECTIONAL STUDY FROM A TERTIARY CARE CENTER IN NORTH INDIA

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ABSTRACT

Background: Atrial fibrillation (AF) is the most common sustained arrhythmia, associated with increased risk of stroke, heart failure, cognitive impairment, and mortality. The burden of AF is growing in India, with unique etiological and clinical profiles compared to Western populations. **Objectives:** To assess the clinical profile, etiological spectrum, and transthoracic echocardiographic (TTE) features of patients with AF attending a tertiary care center in Rajasthan, India.

Materials and Methods: A hospital-based cross-sectional study was conducted at SMS Hospital, Jaipur, including 155 patients ≥ 18 years with electrocardiographically confirmed AF over one year. Detailed clinical history, examination, and TTE were performed. Data were analyzed using SPSS v23; $p < 0.05$ was considered statistically significant.

Results: The mean age was 57.9 ± 12.9 years; the majority were aged 41–60 years (49%). Females (54.8%) slightly outnumbered males. Dyspnea (46.5%) and palpitations (33.5%) were the most frequent presenting symptoms. Rheumatic heart disease (RHD) was the most common etiology (41.2%), followed by coronary artery disease (36.8%), dilated cardiomyopathy (21.3%), and hypertension (18.7%). On echocardiography, left atrial enlargement (65.2%), mitral regurgitation (71%), combined MS/MR (49.7%), and mitral plus aortic valve involvement (29.7%) were predominant. Reduced left ventricular ejection fraction was seen in 53.5%, and left atrial clot in 14% of cases, more frequent in those with MS and LV dysfunction ($p = 0.018$).

Conclusion: AF in this cohort was most common among middle-aged females, with RHD as the leading cause. TTE revealed frequent valvular involvement and chamber enlargement, underscoring the need for region-specific AF management strategies in India.

Keywords: Atrial fibrillation, Rheumatic heart disease, Echocardiography, Clinical profile, India

INTRODUCTION

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia worldwide, with rising

incidence and prevalence across all age groups. It is associated with a fivefold increased risk of stroke, a twofold increase in all-cause mortality, and heightened risk of heart failure and cognitive

impairment.^[1-3] The global burden of AF is significant, with marked regional variation in etiology and outcomes.^[4]

In India, rheumatic heart disease (RHD) continues to be an important contributor to AF, especially among younger populations, in contrast to Western cohorts where hypertension, diabetes, and obesity are the predominant drivers.^[5-9] Echocardiographic assessment plays a pivotal role in delineating the structural substrate of AF, guiding both therapeutic and preventive strategies.^[10-12]

Despite its clinical significance, data from North Indian tertiary care centers on the clinical, etiological, and echocardiographic profile of AF remain limited. This study aimed to characterize these features in patients presenting to a large tertiary hospital in Rajasthan, India.

MATERIALS AND METHODS

Study design and setting: A hospital-based, cross-sectional analytical study was conducted in the Department of Cardiology, SMS Hospital, Jaipur, over a period of one year.

Study population

Inclusion Criteria

- Patients ≥ 18 years of age
- Clinically and electrocardiographically confirmed AF
- Hemodynamically stable at presentation

Exclusion Criteria

- Patients with atrial arrhythmias other than AF
- Postoperative AF or transient AF with reversible causes

Sample size: A total of 155 patients were included consecutively.

Data collection: Detailed history (demographics, comorbidities, presenting symptoms), clinical examination, and laboratory investigations were recorded. Transthoracic echocardiography (TTE) was performed in all patients to assess chamber dimensions, left ventricular ejection fraction (EF), valvular morphology, and presence of thrombus.

Statistical analysis: Data were analyzed using IBM SPSS Statistics v23. Continuous variables were expressed as mean \pm SD, categorical variables as percentages. Associations were tested using chi-square or t-test as appropriate. A p-value < 0.05 was considered statistically significant.

RESULTS

Demographic profile: The mean age of patients was 57.85 ± 12.94 years. The most common age group was 41–60 years (49%). Females (54.8%) were slightly more common than males.

Clinical presentation: Dyspnea (46.5%) and palpitations (33.5%) were the predominant symptoms. Congestive cardiac failure was observed in 54.8% of patients.

Etiological profile

- Rheumatic heart disease (RHD): 41.2%
- Coronary artery disease (CAD): 36.8%
- Dilated cardiomyopathy (DCM): 21.3%
- Hypertension: 18.7%

RHD was significantly more prevalent among younger age groups (18–40 years, $p < 0.05$) and females ($p < 0.05$).

Echocardiographic findings

- Left atrial enlargement: 65.2%
- Right atrial enlargement: 40%
- Left ventricular dysfunction: 53.5%
- Regional wall motion abnormality (RWMA): 21.3%
- Left ventricular hypertrophy: 26.4%
- Left atrial clot: 14% (significantly associated with MS and LV dysfunction, $p = 0.018$)
- Valvular lesions:
 - Mitral regurgitation: 71%
 - Combined MS/MR: 49.7%
 - Severe mitral stenosis: 27.1%
 - Aortic valve involvement: 29.7%

DISCUSSION

This study highlights the unique clinical and echocardiographic features of AF in North Indian patients. Unlike Western cohorts where hypertension and metabolic syndrome dominate^[2,3], our data reaffirm RHD as a leading contributor, particularly among women and younger patients.^[10,11]

The high prevalence of valvular lesions (especially combined mitral and aortic disease) and left atrial enlargement underscores the structural burden of AF in this population. Left atrial thrombus, present in 14% of patients, was strongly associated with MS and LV dysfunction, consistent with prior studies.^[13-19]

Importantly, more than half of the patients had reduced EF, reflecting the bidirectional relationship between AF and heart failure.^[2] This finding has implications for anticoagulation, rhythm control, and tailored therapy.

Our study corroborates findings from the Kerala AF registry and other Indian cohorts, which also noted a high prevalence of valvular AF, female predominance, and significant morbidity.^[6-9] However, compared to developed nations, the younger age at onset and high thromboembolic risk distinguish the Indian AF phenotype.

Strengths and limitations: The study provides real-world, hospital-based insights into AF in a tertiary center. However, being cross-sectional, it cannot establish causality. Longitudinal follow-up was not performed, and subclinical AF may have been missed.

CONCLUSION

In this cohort from a North Indian tertiary center, AF was most common in middle-aged females, with RHD as the predominant etiology. Echocardiography revealed frequent valvular involvement, left atrial enlargement, and LV dysfunction. The findings emphasize the need for aggressive prevention, timely echocardiographic evaluation, and region-specific management strategies for AF in India.

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