Clinical Profile and Risk Factors of Atrial Fibrillation in a North Indian Tertiary Care Population: A Prospective Observational Study

Dr. Srishti Sonwani[1*], Dr. Sutakshee Sonwani[2], Dr. Aparna Jaswal[3]

[1] MBBS, MD Medicine, DrNB Cardiology, Assistant Consultant, Fortis Escorts Heart Institute, Okhla, Delhi, India. sonwanisrishti@gmail.com

[2] MBBS, MD Medicine, DrNB Cardiology, Associate Consultant, Max Super Speciality Hospital, Delhi, India.dhanusutakshee@gmail.com

[3] Director and Head, Certified Cardiac Device Specialist (CCDS), Department of Cardiac Pacing and Electrophysiology, Fortis Escorts Heart Institute, Okhla, Delhi, India. aparnajaswal@hotmail.com

Corresponding Author
Dr. Srishti Sonwani
MBBS, MD Medicine, DrNB Cardiology, Assistant Consultant, Fortis Escorts Heart Institute, Okhla, Delhi, India.
Email ID: sonwanisrishti@gmail.com
Mob: 89897 17028

Abstract

Background: Atrial fibrillation (AF) is the most common sustained arrhythmia worldwide, associated with significant morbidity, mortality, and healthcare burden. Despite its growing prevalence, data on the clinical profile and risk factors of AF in Indian populations remain sparse. This study aimed to evaluate the demographic distribution, presenting symptoms, AF subtypes, and associated comorbidities in patients admitted to a North Indian tertiary care center with AF.

Methods: This prospective, observational study was conducted at Fortis Escorts Heart Institute, New Delhi, between November 2022 and October 2023. Consecutive patients aged ≥18 years with electrocardiographically confirmed AF were enrolled. Clinical history, presenting complaints, and risk factors were recorded. Echocardiographic and laboratory parameters were assessed. Patients were categorized into paroxysmal, persistent, long-standing persistent, or first-diagnosed AF. Data were analyzed using descriptive and inferential statistics, with $p<0.05$ considered significant.

Results: A total of 150 patients (mean age 64.8 ± 13 years, 54% male) were included. The majority (55.3%) were aged 61–80 years. The most common presenting symptoms were dyspnea (63.3%), palpitations (62.7%), and chest discomfort (39.3%). Paroxysmal AF was the predominant subtype (44.7%), followed by long-standing persistent (22.0%), first-diagnosed (19.3%), and persistent AF (14.0%). Hypertension (68.0%), heart failure (65.3%), diabetes mellitus (50.0%), and coronary artery disease (46.7%) were the leading comorbidities. Thyroid disorders (34.7%), chronic kidney disease (37.3%), and valvular heart disease (31.3%) were also frequent. Smoking (32.0%) and alcohol consumption (10.7%) were notable lifestyle factors.

Conclusion: AF in North Indian tertiary care patients predominantly affects elderly males, with paroxysmal AF as the most common subtype. Hypertension, heart failure, diabetes, and coronary artery disease are the major associated comorbidities, underscoring the role of cardiometabolic risk in AF pathogenesis. These findings emphasize the need for region-specific strategies in AF prevention, early detection, and comprehensive risk factor management.

Keywords: atrial fibrillation, epidemiology, risk factors, comorbidities, North India

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia worldwide, associated with significant morbidity, mortality, and healthcare utilization. It is estimated to affect 1–2% of the general population, with prevalence increasing to nearly 10% in individuals over 80 years of age [1]. AF is a major risk factor for ischemic stroke, conferring a nearly five-fold higher risk, in addition to its association with heart failure, cognitive impairment, and increased all-cause mortality [2,3].

The pathophysiology of AF involves a complex interplay of structural and electrophysiological remodeling. Hypertension, coronary artery disease (CAD), diabetes mellitus (DM), chronic kidney disease (CKD), thyroid disorders, obesity, and obstructive sleep apnea are well-established contributors [4,5]. Lifestyle factors such as smoking and alcohol consumption further exacerbate AF susceptibility [6]. Clinical presentation varies widely, from asymptomatic cases to disabling symptoms such as palpitations, dyspnea, chest pain, fatigue, or dizziness [7].

Large multicenter registries from North America and Europe have provided detailed epidemiological data on AF [8,9]. However, information from low- and middle-income countries remains limited. In India, the burden of AF is likely under-recognized, partly due to differences in cardiovascular risk profiles and health system challenges. The earlier onset of hypertension, CAD, and metabolic disease among Indians may predispose them to unique AF patterns compared with Western populations [10]. Sparse data from hospital-based cohorts highlight the need for robust regional epidemiological studies to inform prevention and management strategies better [11].

This study was undertaken to evaluate the clinical profile and distribution of risk factors among patients with AF admitted to a tertiary care center in North India. By analyzing age and sex distribution, presenting complaints, AF subtypes, and associated comorbidities, and comparing these with global patterns, the study aims to contribute essential epidemiological insights on AF in the Indian setting.

Materials and Methods

This was a prospective, observational study conducted at the Department of Cardiology, Fortis Escorts Heart Institute, New Delhi, a tertiary care referral center in North India. The study was carried out over a period of one year, from 1st November 2022 to 31st October 2023.

Study Population

All consecutive patients aged ≥18 years, with a clinically and electrocardiographically confirmed diagnosis of atrial fibrillation (AF), who were admitted to the cardiology department during the study period, were included. Both newly diagnosed and previously known cases of AF were eligible.

Inclusion Criteria

1. Patients ≥18 years of age.

2. Electrocardiographic confirmation of AF (12-lead ECG).

3. Willingness to participate and provide informed consent.

4. All types of AF (paroxysmal, persistent, permanent, and first-diagnosed).

Exclusion Criteria

- Patients with atrial arrhythmias other than AF.

- Patients unwilling to provide consent.

Diagnosis of Atrial Fibrillation

AF diagnosis was made on clinical grounds and confirmed by 12-lead electrocardiography. The following features were used for confirmation:

- Irregularly irregular rhythm with absence of P-waves.

- Fibrillatory (f) waves deforming the baseline.

- Variable RR intervals.

- Variation in QRS morphology.

Clinical and Laboratory Evaluation

A detailed history, clinical examination, and investigations were performed in all patients.

- Presenting complaints such as breathlessness, palpitations, chest pain, fatigue, and neurological symptoms were recorded.

- Risk factors evaluated included hypertension, coronary artery disease (CAD), diabetes mellitus (DM), valvular heart disease, chronic kidney disease (CKD), thyroid disorders, obesity, smoking, alcohol use, and obstructive sleep apnea.

- Echocardiography (2D/M-mode) was performed to assess left atrial size, left ventricular function, valvular pathology, and thrombus formation.

- Chest radiography was done to assess cardiomegaly and pulmonary pathology.

- Laboratory investigations included hemoglobin, serum creatinine, creatinine clearance, and HbA1c levels.

Classification of AF

Patients were categorized into subtypes according to current guidelines:

- Paroxysmal AF (terminates spontaneously within 7 days).

- Persistent AF (lasting >7 days, requiring cardioversion).

- Long-standing persistent AF (>1 year duration).

- Permanent AF (accepted by patient and physician).

Ethical Considerations

The Institutional Ethics Committee of Fortis Escorts Heart Institute, New Delhi, approved the study protocol. Written informed consent was obtained from all participants. Confidentiality of patient data was strictly maintained.

Statistical Analysis

Data were analyzed using SPSS version 25 (IBM Corp, Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables as frequency and percentages. Group comparisons were performed using the independent sample t-test or Mann–Whitney U test for continuous variables and Chi-square/Fisher's exact test for categorical variables. A p-value <0.05 was considered statistically significant.

Results

A total of 150 patients with atrial fibrillation (AF) were enrolled during the study period. The baseline demographic characteristics, clinical presentation, AF subtypes, and distribution of risk factors are summarized below.

Demographic Profile

The mean age of the study population was 64.8 ± 13.0 years (range: 24–94 years). More than half of the patients (55.3%) were between 61 and 80 years of age, while only 3.3% were <40 years. Males accounted for 54% of cases, yielding a male-to-female ratio of 1.17:1. The mean body mass index (BMI) was 23.9 ± 2.6 kg/m², with 20.7% classified as overweight and 3.3% as obese.

Table 1. Age, sex, and BMI distribution of study population (n = 150)

Variable	Subgroup	n (%)
Age group	≤40 years	5 (3.3)
	41–60 years	43 (28.7)
	61–80 years	83 (55.3)
	>80 years	19 (12.7)
Mean ± SD	64.8 ± 13.0 years	
Sex	Male	81 (54.0)
	Female	69 (46.0)
BMI (kg/m²)	18.5–24.9	114 (76.0)
	25–29.9 (Overweight)	31 (20.7)
	30–35 (Obese)	5 (3.3)
Mean ± SD	23.9 ± 2.6	

Clinical Presentation

The most frequent presenting complaints were shortness of breath (63.3%), palpitations (62.7%), and chest pain or heaviness (39.3%). Fatigue was reported by 21.3%, while dizziness (10.7%) and cough (10%) were less common. Neurological presentations, such as slurring of speech or transient weakness, occurred in 3.3%.
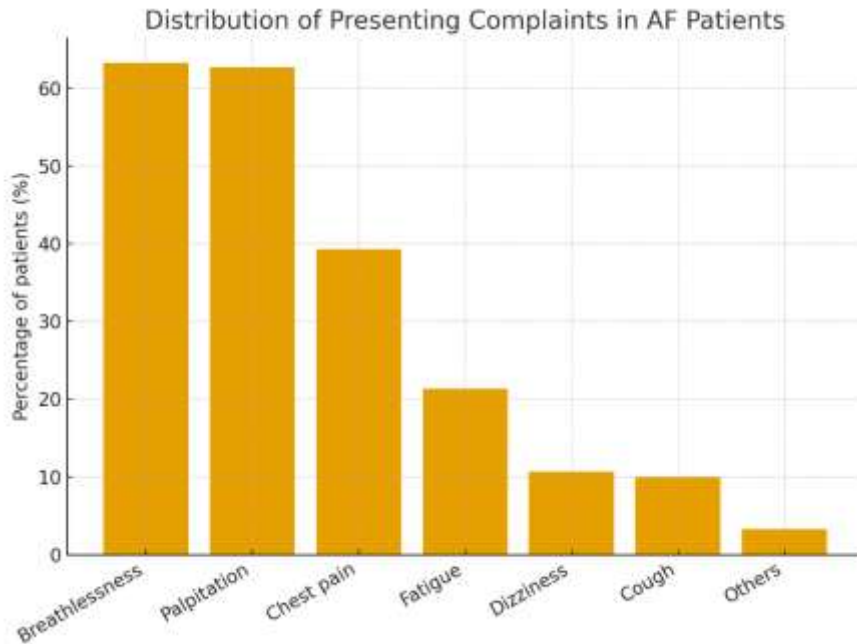
Figure 1. Distribution of presenting complaints among AF patients

Types of AF

Paroxysmal AF was the most prevalent form (44.7%), followed by long-standing persistent (22.0%), first-diagnosed AF (19.3%), and persistent AF (14.0%).

Table 2. Types of AF in the study cohort

Type of AF	n (%)
Paroxysmal	67 (44.7)
Long-standing persistent	33 (22.0)
First diagnosed	29 (19.3)
Persistent	21 (14.0)

Risk Factor Profile

Hypertension was the most common risk factor (68.0%), followed by heart failure (65.3%), diabetes mellitus (50.0%), and coronary artery disease (46.7%). Other significant associations included thyroid disorders (34.7%), chronic kidney disease (37.3%), smoking (32.0%), and valvular heart disease (31.3%). Alcohol use (10.7%) and obstructive sleep apnea (6.7%) were less frequent.
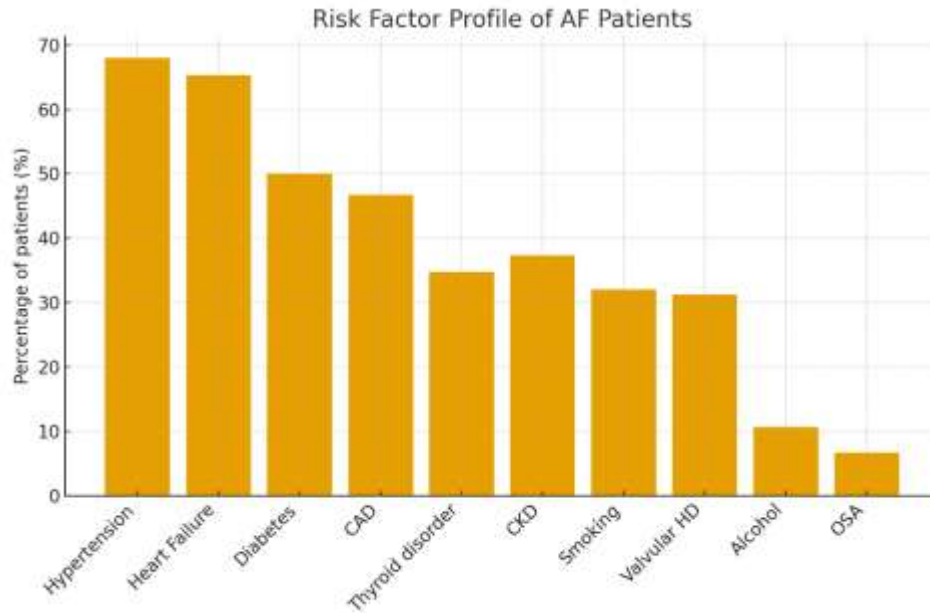
Figure 2. Distribution of major risk factors among AF patients

Discussion

In this prospective study of 150 patients with atrial fibrillation (AF) admitted to a tertiary care center in North India, we observed that AF predominantly affected older adults, with a mean age of 64.8 years, and showed a slight male predominance (54%). The most common presenting complaints were dyspnea (63.3%) and palpitations (62.7%), while paroxysmal AF was the most frequent subtype (44.7%). Hypertension, heart failure, diabetes mellitus, and coronary artery disease were the leading comorbidities.

Demographic and Clinical Profile

Our findings regarding age distribution are consistent with global epidemiological data demonstrating that AF prevalence increases with age, particularly beyond the sixth decade of life [1]. The male predominance in our cohort (M: F = 1.17:1) aligns with earlier studies, including the Framingham Heart Study, which also reported higher AF prevalence among men [12]. In contrast, studies from rural Indian populations, such as the SMART-India cohort, have documented no significant sex differences, possibly reflecting demographic variations between community-based and hospital-based cohorts [11].

Dyspnea and palpitations were the most frequent presenting symptoms in our study, similar to the Global Registry on AF (RE-LY registry), where more than 60% of patients reported these complaints [13]. However, nearly 10% of our patients presented with atypical symptoms such as dizziness or neurological deficits, highlighting the importance of vigilance in diagnosis, particularly given that silent or minimally symptomatic AF is increasingly recognized [14].

Types of AF

Paroxysmal AF emerged as the most common subtype in our cohort, accounting for 44.7% of cases. This is in agreement with the Real-life Global Survey Evaluating Patients with AF (REALISE-AF), where paroxysmal AF comprised 26–40% of cases depending on region [15]. However, compared to Western registries that often report a higher prevalence of permanent AF in hospitalized patients [9], our study suggests that Indian tertiary care populations may present earlier in the disease spectrum, possibly due to increased awareness and access to cardiac evaluation in metropolitan centers.

Risk Factors

Hypertension was the most common comorbidity (68%), followed by heart failure (65.3%) and diabetes mellitus (50%). These findings mirror data from the ATRIA study and ARIC study, both of which identified hypertension and diabetes as major contributors to AF burden [5,16]. The high prevalence of metabolic risk factors in our cohort reflects India's increasing burden of cardiometabolic disease at younger ages compared to Western populations [17].

Coronary artery disease was observed in 46.7% of patients, higher than some community-based estimates but consistent with hospital cohorts from South Asia [18]. Thyroid disorders were seen in 34.7% of patients, supporting evidence that both hyperthyroidism and hypothyroidism predispose to AF in Asian populations [19]. Chronic kidney disease (37.3%) was also highly prevalent, underscoring the complex bidirectional relationship between renal impairment and arrhythmia risk [20].

Comparison with Indian Data

A large Indian registry analysis reported hypertension in 57–70% of AF patients and diabetes in 25–40%, which is in line with our results but suggests an increasing trend in metabolic risk burden [10]. Rheumatic valvular disease, once a dominant cause of AF in India, was present in 31.3% of our cohort, indicating a transition toward non-valvular etiologies similar to global trends [21].

Clinical Implications

The demographic and clinical profile observed in our cohort has important implications for early detection and management. Given the high prevalence of modifiable risk factors such as hypertension, diabetes, and obesity, preventive strategies focusing on lifestyle modification and early cardiovascular screening are essential. Furthermore, the predominance of paroxysmal AF underscores the opportunity for timely interventions before progression to more persistent forms.

Conclusion

In this prospective study of atrial fibrillation patients admitted to a North Indian tertiary care center, we found that AF predominantly affected elderly individuals, with a modest male predominance. Dyspnea and palpitations were the most common presenting complaints, and paroxysmal AF emerged as the leading subtype. Hypertension, heart failure, diabetes mellitus, and coronary artery disease were the most frequent comorbidities, reflecting the strong contribution of cardiometabolic risk factors to AF pathogenesis in the Indian population. Thyroid disorders, chronic kidney disease, and valvular heart disease were also prevalent, highlighting the multifactorial nature of AF.

These findings underscore the importance of early detection and aggressive management of modifiable cardiovascular risk factors to prevent AF onset and progression. Moreover, the observed epidemiological patterns suggest a transition from rheumatic to non-valvular etiologies, paralleling global trends but with a higher burden of metabolic comorbidities. Region-specific strategies focusing on preventive cardiology, timely diagnosis, and comprehensive risk stratification are crucial for reducing the long-term complications and healthcare burden of AF in India.

References

1. Chugh SS, Havmoeller R, Narayanan K, Singh D, Rienstra M, Benjamin EJ, et al. Worldwide epidemiology of atrial fibrillation: A Global Burden of Disease 2010 Study. *Circulation*. 2014;129(8):837-47.

2. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke*. 1991;22(8):983-8.

3. Kirchhof P, Benussi S, Kotecha D, Ahlsson A, Atar D, Casadei B, et al. 2016 ESC Guidelines for the management of atrial fibrillation. *Eur Heart J*. 2016;37(38):2893-962.

4. Wyse DG, Van Gelder IC, Ellinor PT, Go AS, Kalman JM, Narayan SM, et al. Lone atrial fibrillation: does it exist? *J Am Coll Cardiol*. 2014;63(17):1715-23.

5. Huxley RR, Lopez FL, Folsom AR, Agarwal SK, Loehr LR, Soliman EZ, et al. Absolute and attributable risks of atrial fibrillation in relation to optimal and borderline risk factors: the Atherosclerosis Risk in Communities (ARIC) study. *Circulation*. 2011;123(14):1501-8.

6. Kodama S, Saito K, Tanaka S, Horikawa C, Saito A, Heianza Y, et al. Alcohol consumption and risk of atrial fibrillation: a meta-analysis. *J Am Coll Cardiol*. 2011;57(4):427-36.

7. Camm AJ, Lip GYH, De Caterina R, Savelieva I, Atar D, Hohnloser SH, et al. 2012 focused update of the ESC Guidelines for the management of atrial fibrillation. *Eur Heart J*. 2012;33(21):2719-47.

8. Kirchhof P, Breithardt G, Bax J, Benninger G, Blomstrom-Lundqvist C, Boriani G, et al. A roadmap to improve the quality of atrial fibrillation management: proceedings from the fifth AFNET/EHRA consensus conference. *Europace*. 2016;18(1):37-50.

9. Piccini JP, Hammill BG, Sinner MF, Jensen PN, Hernandez AF, Heckbert SR, et al. Incidence and prevalence of atrial fibrillation and associated mortality among Medicare beneficiaries, 1993–2007. *Circ Cardiovasc Qual Outcomes*. 2012;5(1):85-93.

10. Banerjee A, Patel A, Kalra S, Dalal J, Khandelwal S, Nair T, et al. Atrial fibrillation in India: epidemiology, risk factors and management strategies. *Natl Med J India*. 2020;33(1):6-12.

11. Soni A, Karna S, Fahey N, Sethi R, Greenlund K, Pujari S, et al. Age- and sex-specific prevalence of atrial fibrillation in rural central India: The SMART-India study. *Heart Asia*. 2016;8(2):56-61.

12. Benjamin EJ, Wolf PA, D'Agostino RB, Silbershatz H, Kannel WB, Levy D. Impact of atrial fibrillation on the risk of death: The Framingham Heart Study. *Circulation*. 1998;98(10):946-52.

13. Oldgren J, Healey JS, Ezekowitz M, Commerford P, Avezum A, Pais P, et al. Variations in cause and management of atrial fibrillation in a prospective registry of 15,400 emergency department patients: The RE-LY AF registry. *Circulation*. 2014;129(15):1568-76.

14. Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, et al. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation. *Eur Heart J*. 2021;42(5):373-498.

15. Chiang CE, Naditch-Brûlé L, Murin J, Goethals M, Inoue H, O'Neill J, et al. Distribution and risk profile of paroxysmal, persistent, and permanent AF in routine clinical practice: Insights from the REALISE-AF survey. *Circ Arrhythm Electrophysiol*. 2012;5(4):632-9.

16. Go AS, Hylek EM, Phillips KA, Chang Y, Henault LE, Selby JV, et al. Prevalence of diagnosed atrial fibrillation in adults: National implications for rhythm management and stroke prevention. *JAMA*. 2001;285(18):2370-5.

17. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: Current epidemiology and future directions. *Circulation*. 2016;133(16):1605-20.

18. Ahmed I, Kitchlew A, Amin S, Niazi M, Qureshi S. Clinical characteristics and outcomes of atrial fibrillation in a tertiary care hospital in Pakistan. *J Pak Med Assoc*. 2021;71(3):752-8.

19. Klein I, Danzi S. Thyroid disease and the heart. *Circulation*. 2007;116(15):1725-35.

20. Alonso A, Lopez FL, Matsushita K, Loehr LR, Agarwal SK, Chen LY, et al. Chronic kidney disease is associated with the incidence of atrial fibrillation: The Atherosclerosis Risk in Communities (ARIC) study. *Circulation*. 2011;123(25):2946-53.

21. Shakya S, Shrestha NK, Thapa R, Poudel CM. Clinical profile, etiology and use of anticoagulants in patients with atrial fibrillation: A hospital-based study from Nepal. *Nepal Heart J*. 2012;9(1):1-6.