TO ASSESS CLINICAL PROFILE AMONG PATIENTS OF ATRIAL FIBRILLATION IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Atrial fibrillation (AF) is a common arrhythmia associated with increased risks of stroke, heart failure, and mortality. This study aimed to evaluate the clinical characteristics, risk factors, and complications of AF patients.

Material and Methods: A prospective observational study was conducted over 18 months at Sri Aurobindo Medical College and Post Graduate Institute, Indore, involving 75 patients diagnosed with AF. Inclusion criteria included patients over 18 years of age diagnosed via ECG. Data were collected through structured questionnaires and clinical evaluations, including echocardiography, to assess the causes and complications of AF.

Results: The majority of patients were under 65 years, with a female predominance (60%). Shortness of breath (80%) was the most common symptom, followed by chest pain (24%) and palpitations (24%). The most prevalent risk factor was hypertension (32%), followed by rheumatic heart disease (26.7%) and coronary artery disease (24%). Left Atrial enlargement was present in 73.3% of patients, and 81.4% had persistent AF. A high CHA_2DS_2-VASc score (≥2) was found in 78.4%, indicating a high stroke risk. Anticoagulation therapy was prescribed to 76% of patients, with rivaroxaban being the most commonly used drug. Mitral regurgitation was found in 72% of patients, while aortic valve abnormalities were seen in 50.7%. Heart failure was the most common complication, affecting 57.3% of patients, followed by stroke (9.3%) and pulmonary embolism (4%).

Conclusion: The study emphasizes the high prevalence of AF in younger, female patients, with hypertension being the main risk factor. It highlights the importance of tailored anticoagulation therapy and comprehensive management to reduce complications and improve patient outcomes.

Keywords: Atrial fibrillation, risk factors, complications, hypertension, CHA_2DS_2-VASc score, anticoagulation therapy, heart failure, stroke, mitral regurgitation, echocardiography.

INTRODUCTION

Atrial fibrillation (AF) is a prevalent long-term arrhythmia characterized by rapid, irregular atrial activation, which disrupts coordinated atrial contraction, resulting in an irregular

ventricular rate. This condition causes significant hemodynamic issues and increases thromboembolic risks, contributing to high morbidity, mortality, and healthcare costs [1]. Although AF often coexists with structural heart disease, it can occur in individuals without detectable heart conditions. AF is identifiable on an ECG by the absence of normal P-waves, presenting as erratic fibrillatory waves and an irregular ventricular response when AV conduction is intact [2].

AF prevalence rises with age, affecting around 0.4% to 1% of the general population and doubling each decade after age 50, reaching about 10% in people over 80. Men are more frequently diagnosed with AF than women, though women tend to be diagnosed later. Higher prevalence is also seen in White individuals compared to Black individuals [3-6].

AF significantly raises long-term risks for stroke, heart failure, and all-cause mortality, with a particularly high impact on women. The annual ischemic stroke risk for those with nonvalvular AF is about 5%, and for AF patients with rheumatic heart disease, stroke risk is up to 17 times higher than in age-matched controls [7]. Symptoms vary, from palpitations and anxiety in intermittent AF cases to severe complications like cardiogenic shock or cerebrovascular accidents (CVAs) [8]. Hypotheses such as the "mother rotor" and "multiple wavelet" theories address AF's complex pathophysiology, which is compounded by a mix of modifiable and non-modifiable risk factors, including age, hypertension, coronary artery disease, and valvular disease [9-13].

Progression of AF is driven by structural and electrical atrial remodeling, a process where "AF begets AF." This remodeling, marked by atrial enlargement, fibrosis, and conduction heterogeneity, involves multiple pathophysiological mechanisms [14]. Around 30% of AF patients have coexisting valvular disorders, with left atrial size being particularly relevant, especially in cases related to rheumatic heart disease [15,16].

Atrial fibrillation (AF) is classified by the duration and recurrence of episodes, including paroxysmal AF (self-resolving within 7 days), long-standing persistent AF (lasting over a year), permanent AF (persistent without successful cardioversion), and lone AF (present in patients under 60 without structural heart disease, accounting for 10-15% of cases). [16]

Treatment is primarily pharmacological, with non-pharmacological approaches considered in specific scenarios. Diagnostic evaluations focus on identifying underlying causes, and echocardiography is critical in assessing the risk of AF and its associated complications. Stroke prevention is a key treatment objective, commonly assessed using the CHA2DS2-VASc score, though novel biomarkers related to cardiovascular stress and myocardial injury are showing promise in refining risk assessment.

Understanding the risk factors and manifestations of AF, including valvular heart disease, ischemic heart disease, sick sinus syndrome, and cardiomyopathies, is crucial for accurate and early diagnosis. This study aims to explore and evaluate the clinical profiles, risk factors, and complications associated with AF.

MATERIAL AND METHODS

This prospective cross-sectional study was conducted over 18 months, from September 2022 to February 2024, in the Department of General Medicine at Sri Aurobindo Medical College and Post Graduate Institute in Indore, Madhya Pradesh after approval from institutional ethical

committee. A total of 75 AF patients over 18 years old, diagnosed via ECG and meeting inclusion criteria, were enrolled after obtaining informed consent.

Inclusion criteria
- Subjects aged more than 18 years who are diagnosed with AF diagnosed on ECG presenting to Medicine department at SAMC and PGI.

Exclusion criteria
- Patients less than 18 years of age; and
- Patients who did not gave consent for the study.

METHODOLOGY

Baseline data for each enrolled patient were collected using a structured questionnaire. Patients underwent both historical and clinical evaluations, guided by a semi-structured questionnaire, to identify causes and complications associated with atrial fibrillation (AF). Clinical and echocardiographic screenings were conducted to assess potential underlying causes of AF.

Detailed patient histories were taken, focusing on AF-related symptoms—such as palpitations, chest pain, dyspnea, orthopnea, sweating, nausea, and dizziness—and lifestyle factors like smoking and alcohol use. Additionally, the histories included an assessment of co-morbid conditions such as hypertension, rheumatic heart disease, thyrotoxicosis, chronic obstructive pulmonary disease, previous strokes, coronary artery disease, and recurrent heart failure.

A physical examination, particularly cardiovascular-focused, was performed, followed by routine investigations such as ECG, 2D ECHO, cardiac markers, thyroid profile, HbA1c, CBC, creatinine, electrolytes, and serology. Echocardiography was conducted by a cardiologist.Together, these procedures provided a comprehensive assessment of each patient's health status, facilitating the identification of both the causes and complications associated with AF.

Statistical Analysis

Data analysis involved coding and entering data into Microsoft Excel 2010, followed by statistical analysis using SPSS 20.0. Descriptive statistics were used, with categorical variables expressed as percentages and absolute values, compared using Pearson's chi-square test. Continuous variables with normal distribution were expressed as mean ± SD, with correlations assessed using Karl Pearson's or Spearman's correlation coefficient. A p-value <0.05 was deemed statistically significant.

RESULTS

*Demographics and Clinical Characteristics:*The study population consisted of 75 subjects, with a majority of patients being under 65 years of age, making up 62.7% of the total sample. The distribution of age groups showed that 22.7% of subjects were between 65 and 75 years, while 14.7% were over 75 years of age (Table 6). In terms of sex distribution, there was a predominance of female patients (60%), while male patients comprised 40% of the study population.
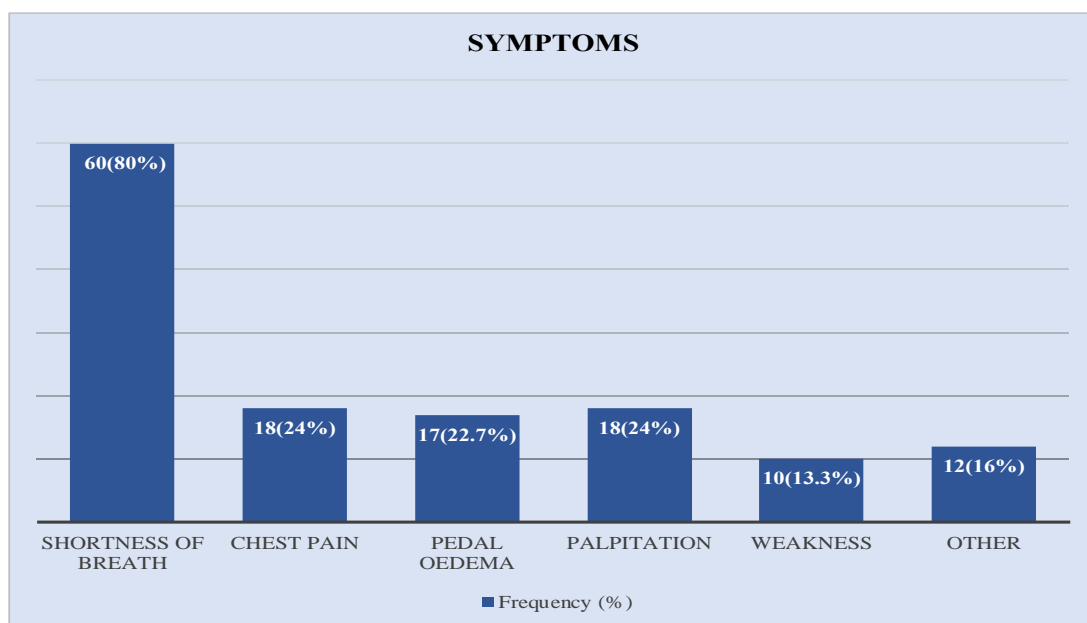
When analyzing the T Marker values, the majority of subjects had abnormal T Marker levels (>0.014), comprising 61.3%, while the remaining 38.7% showed normal T Marker levels (≤0.014). The majority of patients showed normal CPKMB levels (≤25), with 80% falling into this category, while only 20% had abnormal CPKMB levels (>25) (Table 9). Similarly, HbA1C

levels indicated that 78.7% of subjects had normal levels (<6.4), whereas 21.3% exhibited raised HbA1C levels (≥6.4). [Table 1]
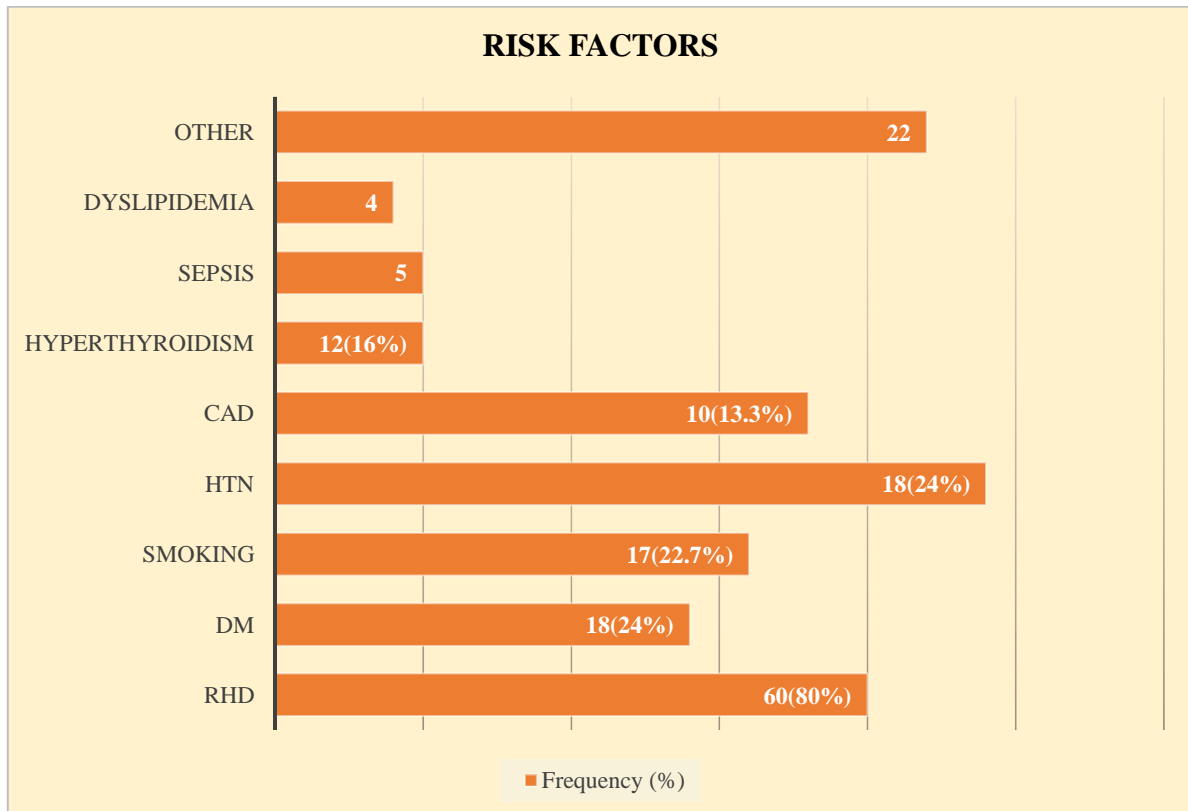
Table 1: Demographics and Clinical Characteristics of Study Population

Characteristic	Frequency	Percent
Age Group		
<65 Years	47	62.7
65-75 Years	17	22.7
>75 Years	11	14.7
Sex		
Female	45	60.0
Male	30	40.0
T Marker		
Normal ≤0.014	29	38.7
Abnormal >0.014	46	61.3
CPKMB		
Normal ≤25	60	80.0
Abnormal >25	15	20.0
HbA1C		
Normal <6.4	59	78.7
Raised ≥6.4	16	21.3

Symptoms and risk factors: Shortness of breath was the most common symptom, reported by 80% of the patients, followed by chest pain and palpitations, each reported by 24% of the subjects. Pedal oedema was observed in 22.7% of cases, while weakness and other symptoms were present in 13.3% and 16% of the patients, respectively. [Graph 1] The most common risk factor among the study population was hypertension (HTN), which affected 32% of the patients. Other significant risk factors included RHD (26.7%), CAD (24%), smoking (21.3%), and diabetes mellitus (DM) (18.7%). A variety of other factors, such as hyperthyroidism, sepsis, and dyslipidemia, were reported in smaller percentages. [Table 2, Graph 2]

Graph 1. Distributionof StudyPopulation onthebasisofSymptoms

RISK FACTORS

(Bar chart — Frequency (%))

- OTHER: 22
- DYSLIPIDEMIA: 4
- SEPSIS: 5
- HYPERTHYROIDISM: 12(16%)
- CAD: 10(13.3%)
- HTN: 18(24%)
- SMOKING: 17(22.7%)
- DM: 18(24%)
- RHD: 60(80%)

Graph 2. Distributionof StudyPopulation onthebasisofrisk factors

Table 2: Symptoms and Risk Factors in the Study Population

| Characteristic	Frequency	Percent
Symptoms		
Shortness of Breath	60	80.0
Chest Pain	18	24.0
Pedal Oedema	17	22.7
Palpitation	18	24.0
Weakness	10	13.3
Other	12	16.0
Risk Factors		
RHD	20	26.7
DM	14	18.7
Smoking	16	21.3
HTN	24	32.0
CAD	18	24.0
Hyperthyroidism	5	6.7
Sepsis	5	6.7
Dyslipidemia	4	5.3
Other	22	29.3

*Cardiac Function, Atrial Size Distribution, Types of AF and CHA2DS2-VASc score:*The study found that 58.7% of patients had normal left ventricular (LV) function (ejection fraction ≥50%), while 41.3% had abnormal/reduced function (<50%). Regarding right ventricular (RV) dysfunction, 68% of patients had no dysfunction, while 32% did. Atrial enlargement was common, with 57.3% showing left atrial dilation, 10.7% bi-atrial enlargement, and 5.3% right

atrial dilation. [Graph 3] Persistent atrial fibrillation (AF) was observed in 81.4% of patients, while 18.7% had paroxysmal AF. Most patients (78.4%) had a CHA2DS2-VASc score ≥2, indicating a higher stroke risk, while 21.6% had a score of 1. These findings highlight significant cardiac abnormalities and an elevated stroke risk in the study population.

Table 3:Distribution of study population depending upon Cardiac Function (LV and RV), Atrial Size Distribution, types of AF and CHA2DS2-VASc Score (Non-valvular AF)

Characteristic	Frequency	Percent
LV function		
Normal ≥50	44	58.7
Abnormal <50	31	41.3
RV function		
Present	24	32.0
Absent	51	68.0
Atrial Size		
LA Dilated	43	57.3
RA Dilated	4	5.3
Bi-Atrial Enlargement	8	10.7
Normal	20	26.7
Types of AF		
Persistent	61	81.4
Paroxysmal	14	18.7
CHA2DS2-VASc Score (Non-valvular AF)		
1	11	21.6
≥2	40	78.4
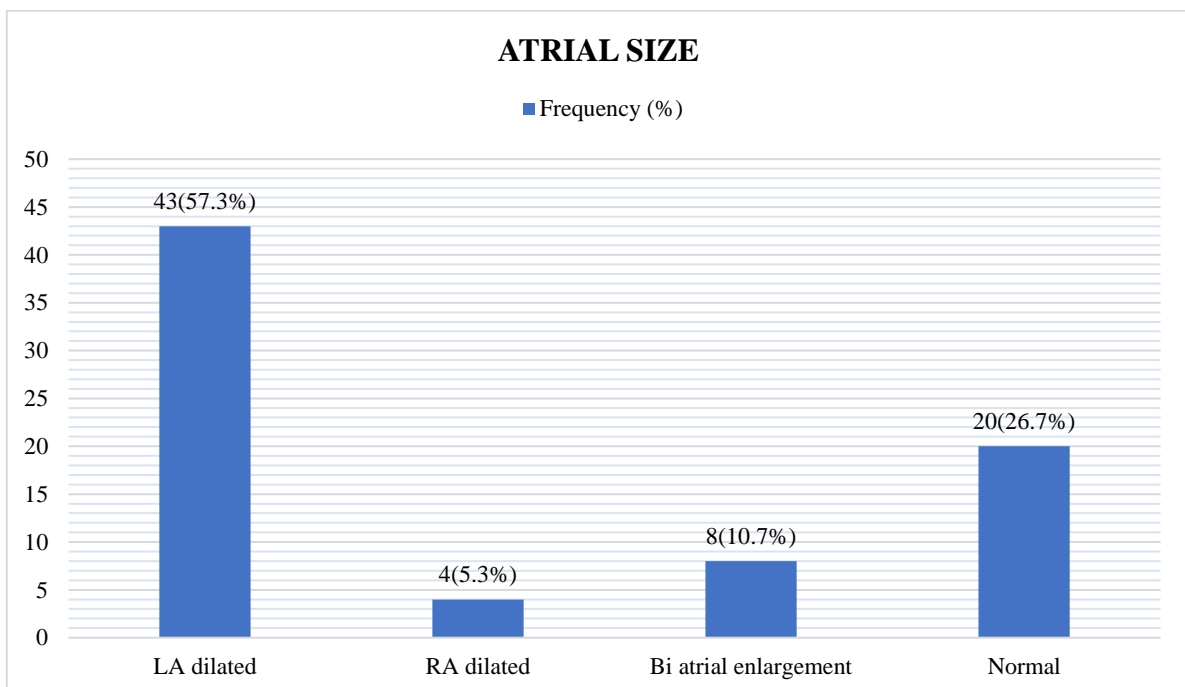
Graph 3. Distributionof StudyPopulation onthebasisof Atrial Size

Anticoagulant Therapy: With respect to anticoagulation therapy, 76% of the patients with non-valvular AF were prescribed anticoagulants, while 24% were not. Among those who received anticoagulation therapy, rivaroxaban was the most common medication (35%), followed by nicumalone (29.8%) and apixaban (21.1%).

Table 4: Distribution of Study Population on the basis of Anticoagulation Medication in Patients with Non-valvular AF

Treatment	Frequency	Percent
Anticoagulation Therapy		
Given	57	76.0
Not Given	18	24.0
Medication (for those receiving therapy)		
Rivaroxaban	15	35.0
Apixaban	9	21.1
Nicumalone	13	29.8
Warfarin	3	7.0
Other	3	7.0

Mitral and Aortic Findings: Mitral regurgitation (MR) was found in 72% of patients, mitral stenosis (MS) in 21.3%, and a normal mitral valve in 6.7%. Regarding aortic findings, 49.3% of patients had a normal aortic valve, while 36% had aortic regurgitation (AR), and 14.7% had aortic stenosis (AS). Mitral valve involvement was more prevalent than aortic valve involvement.

Table 5. Distribution of Study Population Based on Mitral Valve and Aortic Valve Involvement

Valve Involvement	Frequency	Percent
Mitral Valve		
MS	16	21.3%
MR	54	72.0%
Normal	5	6.7%
Aortic Valve		
AS	11	14.7%
AR	27	36.0%
Normal	37	49.3%

Complications: Heart failure was the most common complication, affecting 57.3% of the patients. Other complications included stroke (9.3%), pulmonary embolism (4%), and 34.7% of patients had no complications. [Graph 1]
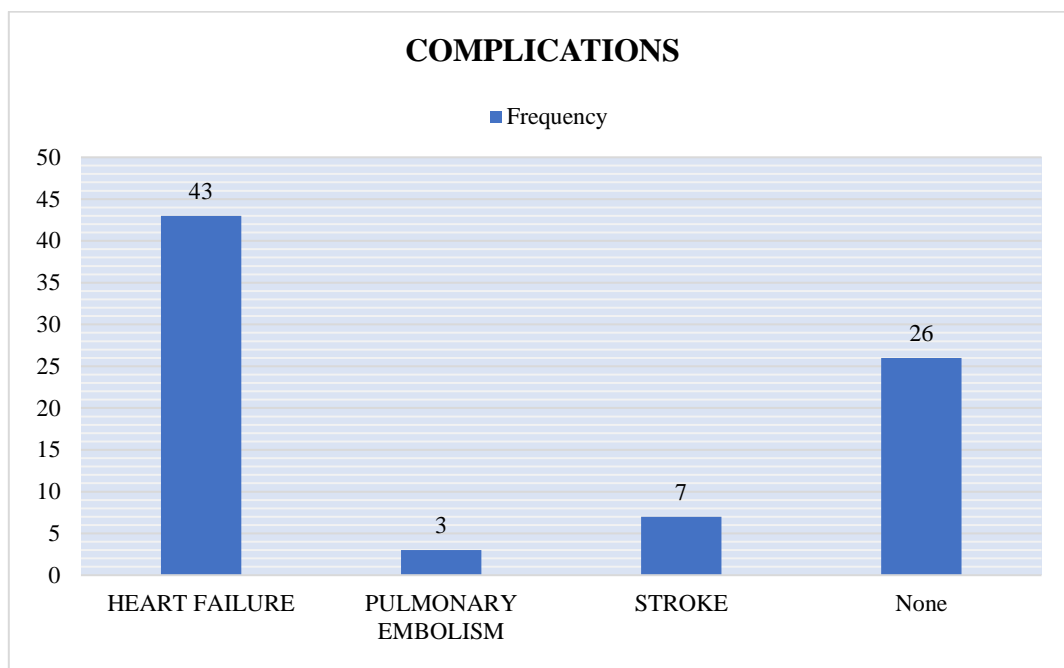
Graph 1. Distribution of Study Population Based on Complications

DISCUSSION

This prospective cross-sectional study was conducted at the Department of General Medicine, Sri Aurobindo Medical College, Indore, involving 75 patients diagnosed with atrial fibrillation (AF) based on ECG findings. The study aimed to assess the clinical profile, risk factors, and complications of AF, including clinical, biochemical, and echocardiographic profiles, risk factors, underlying causes, and outcomes during hospitalization. The study received ethical approval, and patients provided written informed consent.

The study found that 62.7% of patients were under 65 years of age, with a mean age of 58.06 ± 15.27 years (males: 59.13 ± 14.29, females: 57.35 ± 16.01). This is similar to findings in other studies such as Roby A et al., where 61.7% of patients were male, and the majority were aged 50-59 years [2]. The mean age in the study by Kottor GB et al. was 54.98 ± 14.4 years, with a majority of patients (45%) in the 41-60 years age group, which is comparable to our study [1]. In the Indian Heart Rhythm Society-AF registry, the mean age was reported as 54.2 years [17]. Other studies, such as one by Vidya et al. in Bihar, reported a lower mean age of 47 years, with most patients in the 51-60 years age group [18], while Bhardwaj et al. reported a mean age of 51.2 years in Gujarat [19]. A more recent study using the NUVANT Mobile Cardiac Telemetry System found the mean age to be 61.3 years in the US and 57.8 years in India, which aligns with our findings [20].

Regarding gender distribution, this study found that 60% of the patients were female and 40% were male, which contrasts with the general trend of higher AF prevalence in males. This higher female prevalence is also reported by Kottor GB et al., where 63 females were affected compared to 37 males, with a similar mean age for both genders [1].

In this study, the most common symptoms in atrial fibrillation (AF) patients were shortness of breath (80%), followed by chest pain and palpitations (24%), pedal edema (22.7%), other symptoms (16%), and weakness (13.3%). Similar results were reported by Shah et al., with dyspnea (80.54%), palpitation (74.05%), and pedal edema (63.24%) being common symptoms

[21]. Studies from Nepal and India also identified dyspnea and palpitation as frequent presentations [22-25].

Regarding biomarkers, 61.3% of patients had abnormal T Marker levels, suggesting underlying myocardial injury or stress. The majority (80%) had normal CPKMB levels, indicating no significant myocardial damage, while 20% with elevated CPKMB required closer monitoring. For HbA1C, 78.7% had normal levels, but the 21.3% with elevated HbA1C are at increased risk for diabetes complications, highlighting the need for targeted management. These findings stress the importance of comprehensive monitoring and personalized treatment.

In this study, 58.7% of subjects had normal left ventricular (LV) function, indicating adequate cardiac performance with an ejection fraction of 50% or higher, while 41.3% exhibited abnormal LV function, suggesting compromised cardiac output. This highlights the importance of regular cardiac assessments to prevent heart failure progression. Regarding right ventricular (RV) function, 68.0% showed no RV dysfunction, but 32.0% had RV dysfunction, which can lead to symptoms like peripheral edema and may be linked to pulmonary conditions or left heart failure, stressing the need for careful monitoring and treatment.

The most prevalent risk factors in the population were hypertension (32.0%), rheumatic heart disease (26.7%), coronary artery disease (24.0%), and smoking (21.3%). Diabetes mellitus was identified in 18.7%, while hyperthyroidism and sepsis were noted in 6.7% each. Dyslipidemia affected 5.3%, and chronic obstructive pulmonary disease (COPD) was the least common at 2.7%.

Comparing with studies by Gautam MP et al., rheumatic heart disease (RHD) was the most common cause of atrial fibrillation (AF), followed by idiopathic causes, coronary artery disease (16.18%), and hypertension (8.82%) [26]. Thyrotoxicosis was observed in 7.53%, and chronic obstructive airway disease in 5.88%. Nanda et al. [27] reported structural heart disease in 86.36% of AF cases, with valvular heart disease being the most prevalent, seen in 51.51%. Non-structural heart disease was found in 10.6%, with thyrotoxicosis and chronic obstructive airway disease contributing to AF in 6.06% of cases. These findings align with our study, but in contrast, Kumar T et al. observed significantly higher rates of idiopathic causes for AF than in our study [24].

In our study, 57.3% of the 75 patients exhibited left atrial (LA) dilation, which was the most common finding, followed by bi-atrial enlargement in 10.7% and right atrial (RA) dilation in 5.3%. These results emphasize the predominance of LA dilation in atrial fibrillation (AF), with lower occurrences of RA dilation and bi-atrial enlargement. A similar study by Gautam MP et al. found that 57.35% of subjects had dilated left atrium, which was the most common abnormality among the 65% with abnormal echocardiographic findings [26]. Nanda et al. [27] and Kumar T et al. [26] also reported high rates of left atrial dilation, consistent with our findings. In Nanda et al.'s study, 62.1% of subjects had left atrial size >3.5 cm, with valvular heart disease, especially mitral stenosis, being a major cause. Kumar T et al. observed left atrial dilation in 68% of subjects, in line with the ALFA study results [24].

Atrial fibrillation (AF) can cause blood clots in the heart's atria, particularly in the left atrial appendage (LAA), due to disrupted electrical impulses that prevent adequate contraction of the atria, causing blood to pool. In our study, 81.3% of subjects showed no left atrial clot, while 6% had a left atrial clot and 4.5% had an LAA clot. Among those with LA dilation (57.3%) and bi-atrial enlargement (10.7%), 18.7% had LA or LAA clot. A Chinese study showed a moderate to

significant statistical correlation between left atrial size and clot formation, though no correlation was found in patients with small valve areas and big valve gradients in mitral stenosis [28]. Other studies have also highlighted the impact of AF rhythm on left atrial clot formation [29-31].

In this study, 68.0% of subjects had non-valvular atrial fibrillation (AF), which requires careful management to prevent stroke and control symptoms, while 32.0% had valvular AF, associated with underlying valvular heart disease and a higher risk of complications. Shah et al. reported a similar distribution, with 54.59% of patients having valvular AF, though non-valvular AF was more predominant in the current study [98]. Other studies, including those by Noubiap J et al. [32] and Gautam M et al. [26], found valvular causes more common, while Dhungana SP et al. [33] and Dhungel S et al. [23] reported non-valvular causes as dominant, consistent with our findings.

Regarding the CHA2DS2-VASc score, the majority of patients (78.4%) had a score of 2 or higher, indicating the need for oral anticoagulation therapy. Shah et al. [98] similarly found that a CHA2DS2-VASc score of 2 or higher typically calls for anticoagulants, a practice in line with guidelines and other studies conducted in Nepal and India. The CHA2DS2-VASc score is crucial for assessing ischemic stroke risk, with higher scores correlating with greater risk. In a study by Guzel T et al. [34], 349 patients were classified as low-intermediate risk, while 2,243 patients were in the high-risk group. In our study, 76% of patients were on anticoagulation therapy, with rivaroxaban being the most prescribed (35%), followed by nicoumalone (17%) and apixaban (12%). Similar trends were observed in Guzel T et al.'s [34] study, where warfarin was the most commonly prescribed anticoagulant (31.2%).

Additionally, studies by Pan et al. [35] and Laliberté F et al. [36] highlight that fixed-dose combination therapy improves patient compliance compared to two-drug regimens. In our study, 81.4% of patients had persistent AF, while only 18.7% had paroxysmal AF, showing a clear predominance of persistent AF. This trend was similar to Gautam MP et al.'s [26] study, where most patients had persistent or permanent AF.

The study found that heart failure was the most common complication, affecting 57.3% of patients, followed by no complication (34.7%), stroke (9.3%), and pulmonary embolism (4%). Among the stroke patients, all had a CHA2DS2-VASc score >2, with 85.7% receiving anticoagulation. A similar study by Shah et al. revealed that 77.84% of patients with atrial fibrillation (AF) developed congestive cardiac failure, while 4.32% had ischemic stroke. The study also utilized the CHA2DS2-VASc scoring system to stratify stroke risk, identifying 5.95% of patients with thromboembolic events, all of whom had a score of 2 or higher. This highlights the need for effective management and monitoring of AF to reduce complications and mortality [21].

Regarding mitral valve assessment, 72.0% of subjects had mitral regurgitation (MR), 21.3% had mitral stenosis (MS), and 6.7% had normal mitral valve function. The high prevalence of MR emphasizes the need for timely management to prevent left ventricular dysfunction and heart failure. MS, found in 21.3% of subjects, requires treatment to control symptoms and prevent complications such as atrial fibrillation. Early detection and intervention are crucial for both MR and MS. The study also highlighted that the mitral valve was more commonly involved than the aortic valve in the study population.

In aortic valve assessment, 49.3% of subjects had normal aortic valve function, 36.0% had aortic regurgitation (AR), and 14.7% had aortic stenosis (AS). AR, affecting 36.0% of patients, may lead to heart failure if untreated and requires regular monitoring and possible surgical intervention. AS, although less common, can lead to left ventricular hypertrophy and heart failure, necessitating timely diagnosis and intervention. The study emphasizes the importance of proactive management of mitral and aortic valve conditions to improve patient outcomes and prevent complications.

The study's limitations include a small sample size of 75 subjects, a single-center design, and the lack of long-term follow-up, which may affect the generalizability and causality of the findings. Additionally, self-reported data and variability in anticoagulation therapy introduce potential biases. Larger, multi-center, longitudinal studies are needed for more robust conclusions.

CONCLUSION

In conclusion, this study provides valuable insights into the clinical characteristics and management of atrial fibrillation (AF). The findings reveal a higher prevalence of AF in younger, female patients, with hypertension as the most common risk factor. The study emphasizes the importance of tailored anticoagulation therapy, especially for patients with elevated $CHA_2 DS_2$ -VASc scores. Heart failure and stroke were common complications, and valvular issues, including mitral and aortic regurgitation, were frequently observed. These results highlight the need for a comprehensive approach to managing AF to improve patient outcomes and guide future research.

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