

Original Research Article

Nonvalvular atrial fibrillation: a study of epidemiology, demography and clinicoetiological profile in Central India

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ABSTRACT

Background: Atrial fibrillation (AF) is the most common sustained disorder of cardiac rhythm. To study the epidemiology, demography and clinicoetiological profile of nonvalvular atrial fibrillation, such studies are sparse in India.

Methods: One hundred sixty-five patients of nonvalvular atrial fibrillation were enrolled prospectively in the study during the period February 2017 to May 2018. Patients with an electrocardiographic documentation of atrial fibrillation, either chronic or paroxysmal were enrolled in the study. Patients underwent thorough physical examination, routine laboratory testing, and other relevant investigations to assess the underlying etiology. Baseline characteristics of all the patients viz. type of AF, primary etiological diagnosis, and baseline clinical parameters were noted. Statistical analysis was done using percentage analysis.

Results: A total of 165 patients were enrolled in the study. The vast majority of patients were elderly; with the majority being in the 56-65 years age group (45.45%). AF was more common in men (56.3%). Systemic hypertension was the most common etiological association (80%).

Conclusions: Present study found that advanced age and male gender are significant risk factors for AF. Systemic hypertension is the most common etiological association with nonvalvular AF.

Keywords: Embolism, epidemiology and clinico-etiological profile, Nonvalvular atrial fibrillation, Paroxysmal AF

INTRODUCTION

Atrial fibrillation (AF) is the most common sustained cardiac rhythm disturbance accounting for one third of hospitalization for cardiac rhythm disturbance.¹ The estimated prevalence of AF is 0.4% to 1% in the general population, increasing with age. It occurs in about 1% of those under 60 years of age but about 8% of those over 80 years of age. The age adjusted prevalence of AF is higher in men.

AF has a heterogeneous clinical presentation and can be asymptomatic. It is often associated with heart disease but may occur in patient with no other detectable cardiac disease.¹ By convention, the term "nonvalvular AF" is restricted to cases in which the rhythm disturbance occurs in the absence of mitral valve disease, a prosthetic heart valve or mitral valve repair.¹

AF has significant morbidity and mortality due to the occurrence of both hemodynamic impairment and thromboembolic events, especially in the women. The

hemodynamic impairment and rhythm disturbances may be symptomatic and can lead to a decrease in the quality of life. However, most of the mortality and functional impairment associated with AF is due to ischemic stroke and other systemic emboli. The frequency of ischemic stroke and systemic embolism in patients with nonvalvular AF is approximately 5% per year that is about 2 to 7 times the rate for patient without AF. If transient ischemic attacks (TIAs) and radio graphically detected "silent" stroke are included, the rate of ischemic brain injury exceeds 7% per year.²⁻⁶ Mortality in AF patient is double that of patients in normal sinus rhythm this is linked with the severity of the underlying heart disease.⁷⁻⁹

The risk of stroke and systemic embolism in patients with AF is determined by patient risk factors. Risk factors for stroke and systemic embolism in patient with nonvalvular AF are a history of previous stroke of transient ischemic attacks (TIA), a history of hypertension, left ventricular dysfunction (LVD) or congestive heart failure (CHF), age (over 75years), diabetes mellitus and coronary artery disease.

Patients without any of these risk factors i.e. lone AF, have a more favorable prognosis, In the Framingham heart study, patient with rheumatic heart disease and AF had a 17- fold increased risk of stroke compared with age matched controls and the attributed risk was 5 time greater than in those with non-rheumatic AF.^{10,11}

Studies discussing the epidemiology of nonvalvular atrial fibrillation are available in Western literature, such similar studies are however sparse in India. The need for such a study assumes tremendous significance as it is well known that the patient population and pattern of disease in India varies considerably from that of the West.

The aim of the present endeavor was to study the epidemiology of nonvalvular atrial fibrillation.

METHODS

This was an observational study of patients with nonvalvular atrial fibrillation. The study database was accumulated by registering patients presenting to the hospital with a diagnosis of atrial fibrillation, either chronic or paroxysmal. All consecutive patients aged ≥ 18 years of either gender presenting during the period of February 2017 to May 2018 were included in the study.

Inclusion criteria

Patients were included if they had an electrocardiographic documentation of atrial fibrillation, either chronic or transient, during the preceding 6 months. Atrial fibrillation was classified into persistent, permanent or paroxysmal AF according to the American

College of CARDIOLOGY/ American Heart Association (ACC/ AHA) guidelines

- Persistent AF: defined as that lasting more than 7 days, and which would continue indefinitely unless cardioverted.
- Permanent AF; AF, in which cardioversion has failed or has not been attempted.
- Paroxysmal AF: defined as the presence of paroxysms of AF previously documented on an electrocardiogram or 24-hour Holter monitoring, with subsequent reversion to sinus rhythm within a period of 7 days, but usually within 24 hours.

Exclusion criteria

- Patient with valvular heart disease.
- Patients with arrhythmias other than atrial fibrillation, e.g. atrial flutter, atrial tachycardias were excluded from the study population.
- Patients' refusal to give consent.

Written informed consent was obtained from all patients for participation in the study.

Study protocol

Patients underwent detailed clinical evaluation, routine laboratory testing, 12 lead ECGs with rhythm strip recording, chest skiagram, and special investigations viz. echocardiography, thyroid hormone estimation, pulmonary function testing, and stress tests where needed. Primary etiological diagnosis was made in each case, either cardiovascular or non- cardiac, on the basis of clinical evaluation and laboratory parameters. Co-existing medical conditions and illnesses were also recorded.

Statistical analysis

Patient population was analyzed for demographic distribution, etiological associations, continuous data are expressed as the mean value ± 2 standard deviations. Percentage analysis was used to describe distribution of demographic variables.

RESULTS

Baseline characteristics

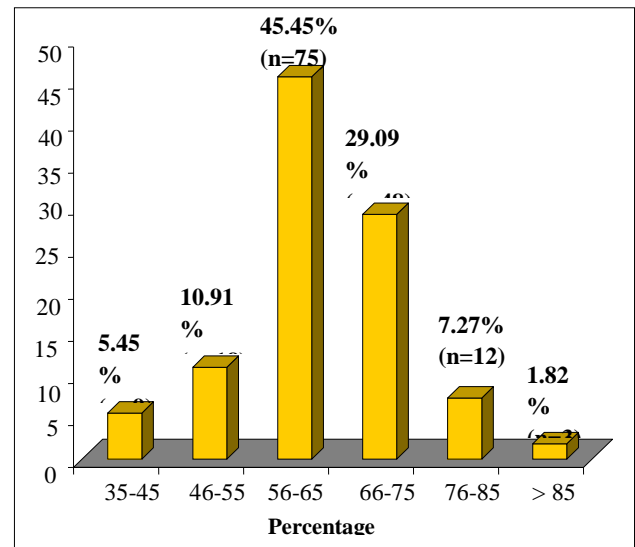
Table 1 shows the baseline characteristics of study participants; the age of patients ranged from 35 years to 88 years and mean age was 64.71 ± 9.7 years, majority 93 patients (56.36%) were males, the mean body mass index was $23.82 \pm 4.3 \text{ kg/m}^2$, the mean systolic blood pressure was $130.7 \pm 19.6 \text{ mmHg}$, and the mean diastolic blood pressure was $83.24 \pm 8.8 \text{ mmHg}$.

Table 1: Atrial fibrillation cohort: baseline characteristics (N=165).

Characteristic	Mean, (Range)
Age (years)	64.71, SD 9.7, (35-88)
BMI (kg/m ²)	23.82, SD 4.3, (15.94-33.75)
Blood pressure	
Systolic (mm Hg)	130.7, SD 19.6, (90-180)
Diastolic (mm Hg)	83.24, SD 8.8, (60-100)
Sex	No. (%)
Male	93 (56.36)
Female	72 (43.64)
Type of atrial fibrillation	
Paroxysmal	42 (25.45)
Persistent	72 (43.64)
Permanent	51 (30.91)
CHA₂DS₂-VASc score	
0	9 (5.45)
1	60 (36.36)
≥ 2	96 (58.18)
Functional class (NYHA)	
I	60 (36.36)
II	24 (14.55)
III	48 (29.09)
IV	33 (20.00)
Comorbidities	
Hypertension	117 (70.90)
Heart failure	102 (61.81)
Prior myocardial infarction	42 (25.54)
DCM	30 (18.18)
COPD	27 (16.36)
Diabetes	9 (5.45)
Lone AF	6 (3.63)
Bronchial asthma	3 (1.82)
Congenital heart disease (CSD)	3 (1.82)
WPW syndrome	3 (1.82)
HCM	3 (1.82)
ECG	
Pathological Q wave (Old MI)	33 (20.00)
Intraventricular conduction defect (IVCD)	33 (20.00)
RBBB	9 (5.45)
LBBB	9 (5.45)
LAHB	3 (1.82)
Non-specific IVCD	12 (7.27)
LVH	21 (12.72)
Addiction	
Tobacco (current)	24 (14.54)
Tobacco (former)	39 (23.63)
Alcohol (current)	9 (5.45)
Alcohol (former)	12 (7.27)

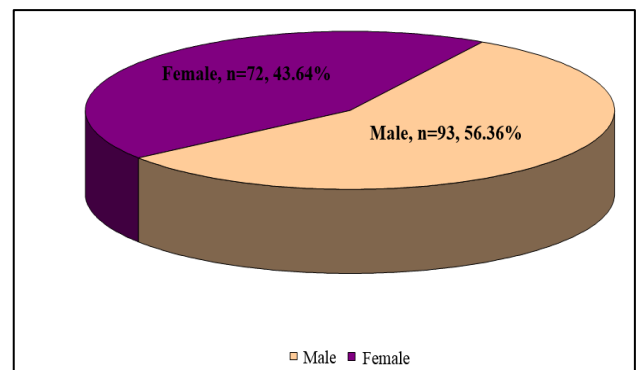
Age

In present study, the age of patients ranged from 35 years to 88 years and mean age was 64.71±9.7 years (Table 1). Majority (45.45%) of patients were in the 56-65 years age group; 9 patients (5.45%) were in the 35-45 age group; 18 patients (10.91%) were in the 46-55 age group; 48 patients (29.09 %) were in the 66-75 year age group, and 15 patients (9.09%) were older than 75 years of age (Figure 1).

**Figure 1: Age wise distribution of patients.**

Gender

Of the 165 patients enrolled in the study, majority 93 patients (56.36%) were males (Figure 2, Table 1).

**Figure 2: Gender wise distribution of patients.**

Body Mass Index

In present study, the body mass index of patients ranged from 15.94 to 33.75kg/m².

The mean body mass index of all the patients was 23.82±4.3 kg/m² (Table 1).

Blood pressure

The mean systolic blood pressure of the study population was 130.7 ± 19.6 mmHg, and the mean diastolic blood pressure was 83.24 ± 8.8 mmHg (Table 1).

Type of AF

Of 165 patients, 72 patients (43.64%) were considered to have persistent atrial fibrillation, 51 patients (30.91%) were having permanent atrial fibrillation and 42 patients (25.45%) had paroxysmal atrial fibrillation (Figure 3, Table 1).

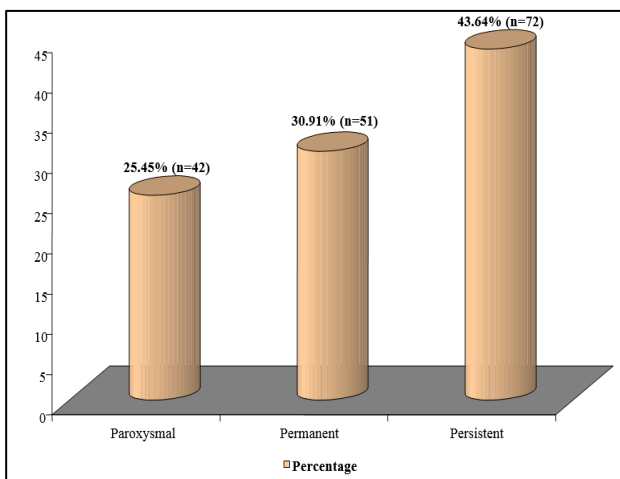


Figure 3: Distribution of patients according to type of atrial fibrillation.

CHA₂DS₂-VASc score

In present study, majority of the patients were having CHA₂DS₂-VASc score >2. Of 165 patients, 96 patients (58.18 %) had CHA₂DS₂-VASc score >2, 60 patients (36.36%) were having CHA₂DS₂-VASc score 1, while only 9 patients (5.45%) had CHA₂DS₂-VASc score 0 (Figure 4, Table 1).

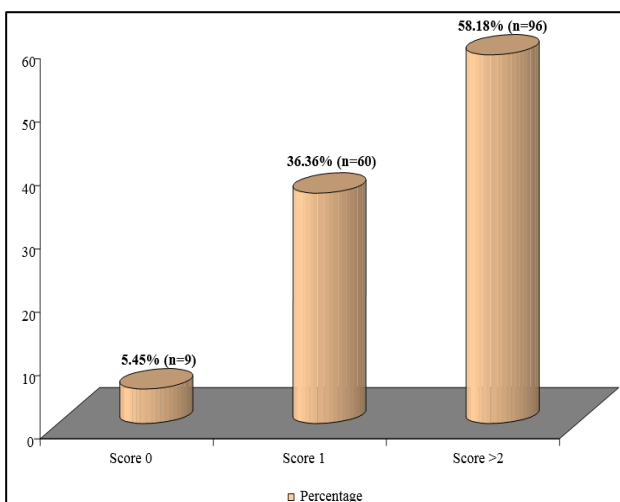


Figure 4: Distribution of patients according to CHA₂DS₂-VASc Score.

Functional class

In our study, functional classification of patients was done using the NYHA classification system. Majority of the patients were in NYHA class I -60 patients (36.36%), 24 patients (14.55%) were in class II, 48 patients (29.09%) were in class III, and 33 patients (20 %) were in Class IV (Figure 5, Table 1).

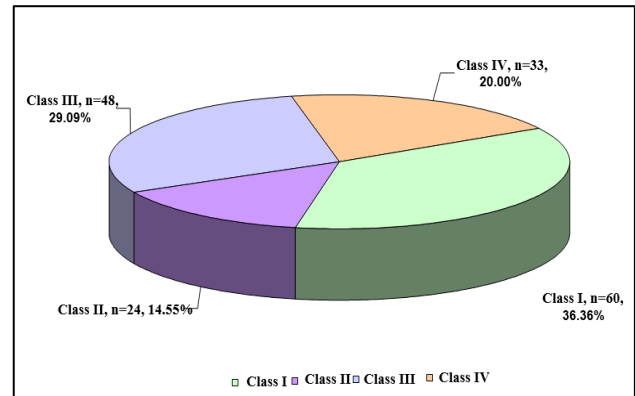


Figure 5: Distribution of patients according to functional classification.

Comorbidities /Etiology

In present study, majority of the patients were having systemic hypertension as the most common etiological association (117 patients -70.90%). Other co-morbid conditions included - heart failure 102 patients (61.81%), prior myocardial infarction- 42 patients (25.54%), dilated cardiomyopathy -30 patients (18.18%), chronic obstructive pulmonary disease -27 patients (16.36%), diabetes mellitus- 9 patients (5.45%), bronchial asthma-3 patient (1.82%), congenital heart disease (atrial septal defect)- 3 patient (1.82%), hypertrophic cardiomyopathy-3 patient (1.82%), Wolff-Parkinson-White syndrome-3 patient (1.82%), 6 patients (3.63%) were considered to be having lone AF, where no cause could be attributed to AF (Figure 6, Table 1).

ECG

During the course of the study, we found that 33 patients (20%) had a baseline ECG showing pathological Q wave, 33 patients (20%) had intraventricular conduction defect (IVCD), out of which 9 patients (5.45%) had right bundle branch block (RBBB), 9 patients (5.45%) had left bundle branch block (LBBB), 3 patient (1.82%) had left anterior hemi block (LAHB), and 12 patients (7.27%) had non-specific intraventricular conduction defect. Twenty one patients (12.72%) had left ventricular hypertrophy (LVH) at baseline ECG (Figure 7, Table 1).

Addiction

While looking for addiction, we found that 63 patients (38.18%) had a history of chronic tobacco use, out of them 39 patients (23.63%) were former tobacco users, and 24 patients (14.54%) were current tobacco users. There were 12 patients (7.27%) who gave history of alcohol use in the past, while 9 (5.45%) patient had history of alcohol use currently (Table 1).

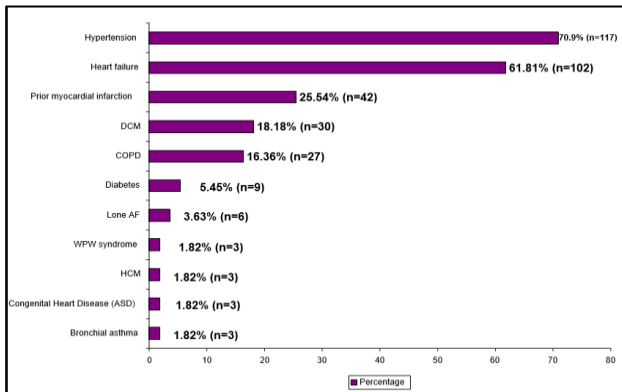


Figure 6: Distribution of patients according to comorbidities.

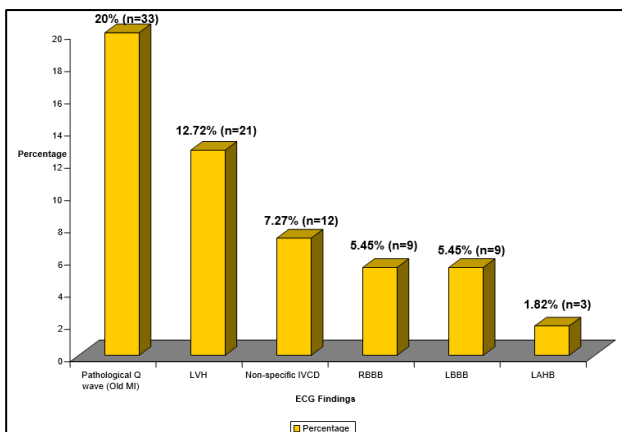


Figure 7: Distribution of patients according to ECG findings.

Thromboembolic complications

The patients were evaluated for the presence of pre-existing thromboembolic complications during the preceding 2 years based on hospital admissions and clinic records (Table 2). Fifteen patients (9.09% i.e. 4.54% per year) had stroke during the preceding two years. Three patients (1.81% i.e. 0.95% per year) had a history of transient ischemic attack. Neither of the patients had any history of non-CNS systemic embolism.

DISCUSSION

In Western literature, the median age of AF patients is about 75 years.¹ Approximately 70% are between 65 and

85years old. In present study, age was an important determinant for AF risk, 83.63% of patients were >55years, with the majority being in the 56-65 years age group (45.45%). Mean age of the patients in our study was 64.71 years±9.7years; this is consistent with Asian data, where the mean age of AF patients was 67.0 years±10.2 years.¹² This is clearly an issue that deserves further attention as the elderly population continues to grow rapidly and public health burdens steadily increase.

The age-adjusted prevalence of AF is higher in men in whom the prevalence has more than doubled from the 1970s to the 1990s, while the prevalence in women has remained unchanged.¹⁴ In present study, male gender was risk for AF, which is consistent with other studies.^{8,13} Of the 165 patients enrolled in the study, the majority 56.36% were males.

The mean body mass index of all the patients in the study was 23.82±4.3kg/m². Present study cannot prove that an elevated body mass index is related to the prevalence of AF, although obesity was identified as an important risk factor.¹ The non-significant association might be attributable to the relatively low body mass index among our study participants, compared with Caucasians so that inconclusive result was found.

In present study, majority (70.90%) had systemic hypertension as the most common etiological association. Other co-morbid conditions included- heart failure (61.81%), prior myocardial infarction (25.54%), dilated cardiomyopathy (18.18%), chronic obstructive pulmonary disease, diabetes (5.45%), bronchial asthma (1.82%), congenital heart disease (atrial septal defect) (1.82%), hypertrophic cardiomyopathy (1.82%), Wolff - Parkinson -White syndrome (1.82%), 6 patients (3.63%) were considered to be having lone AF, where no cause could be attributed to AF.

This is consistent with Western data where hypertension is the leading association for nonvalvular atrial fibrillation.¹⁵ Present study findings however differ from the studies in the Indian subcontinent, where they found ischemic heart disease to be the leading cause of nonvalvular AF.¹⁶⁻¹⁸ Das SS et al, in their 5-year follow-up study of 335 patients of non-valvular AF found ischemic heart disease as the most common etiology (54%).¹⁶ Chowdhury et al, in their etiological study of AF similarly found ischemic heart disease to be the commonest association after valvular heart disease.¹⁷ Sharma S et al, also reported a similar finding in their study of 70 patients of AF where ischemic heart disease constituted 24% of AF patients while hypertension was present in 4.2%.¹⁸

Present study findings support the notion that AF is a significant predictor for stroke. In present study, the annual risk of stroke with AF was 4.54% per year. This is consistent with Western data where, the annual risk of

stroke with AF is in the range of 3% to 8% per year, depending on associated stroke risk factors.¹¹

The mechanism of hydrocephalus is both obstruction as well as reduced absorption, sometimes to variable proportions. Over a period of time, there occurs a change in fluid dynamics, wherein there is increase in absorption and more accommodative CSF spaces.

Present study had several potential limitations. First, the incident cases of AF events were relatively so small that the power to detect the risk of AF might have been reduced.

The present study reports natural history amongst AF population for two years retrospectively, which may be inadequate to judge the associated complications, morbidity and mortality.

CONCLUSION

To conclude, authors have found that advanced age and male gender are significant risks for AF incidence. Nonvalvular AF occurring in elderly population; largely contributes to the burden of non-valvular AF in the central Indian population, which is consistent with Western literature. Authors have found that systemic hypertension is the most common etiological association with nonvalvular AF in the central Indian population, which is consistent with Western literature. Present study findings support the notion that AF is a significant predictor for stroke.

The need to educate the public as well as the medical community regarding burden and risk associated with AF in the population is too obvious. Early recognition of AF in patients with risk factors and timely treatment of underlying conditions and thromboembolic prophylaxis are going to reduce the suffering associated with AF.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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