

A Prospective Research to Determine the Clinico-Etiologic and Echocardiographic Profiles of Patients with Atrial Fibrillation

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Abstract

Aim: The clinical and echocardiographic assessment of patients with atrial fibrillation. **Methods:** The present study was conducted in the Department of Cardiology, Patna medical college and Hospital, Patna Bihar, India for 15 months. Total 120 patients were evaluated clinically, and detailed Cardiovascular, Neurological examination was done to evaluate etiology and for any evidence of thromboembolism. Echocardiography was also done. **Results:** Among the total 120 patients, males were predominant in this study as 66.67 % and females were 33.33 %. 110 patients (91.67%) in this study were hypertensive, 26 patients (21.67%) were diabetic, 41 patients (34.17%) had a significant history of Alcohol consumption and history of smoking was present in 13 patients (10.83%). Metabolic Syndrome was present in 17 patients (14.17 %). The most predominant presenting symptom was dyspnea that was class IV in 75 patients (62.5%) followed by pedal edema in 41 patients (34.17%), Stroke in 23 patients (19.17%), Palpitations in 20 patients (16.67%), Typical Chest Pain in 7 patients (5.83%) and in 20 patients (10 %) AF was discovered incidentally during work up of some intercurrent illness. It was seen in 73 patients out of 107 (68.22%) followed by Coronary artery disease (CAD) in 21 patients (19.63%), Dilated Cardiomyopathy (DCM) in 5 patients (4.67%) and 2 patient (1.87%) each of congenital heart disease (CHD), Hypertrophic Obstructive Cardiomyopathy (HOCM), Chronic Obstructive Pulmonary Disease (COPD) and Lone AF. Among the cases of valvular AF of 13 patients, Mitral stenosis with Mitral regurgitation was the most common lesion found in 11 patients (84.62%). 11 patients (84.62%) out of 13 had severe Mitral Stenosis having valve area of <1.5 cm². Mean LA Size in this study was 48.15±10.05 mm. Ejection Fraction (EF) was found to be more than 44% in 87 patients (72.5%) and less than 44% in 33 patients (27.5%) as evaluated in the study. Left ventricular hypertrophy (LVH) was seen in 91 patients. Diastolic Dysfunction was seen in 19 patients (15.83%) out of 120. **Conclusion:** we concluded that the hypertensive heart disease was the most common etiology in elderly age group. Presence of LVH or left atrial enlargement in patients with hypertensive heart disease requires early management to improve the outcomes.

Keywords: Atrial fibrillation, Left atrial size, Left ventricular hypertrophy.

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Introduction

Atrial fibrillation (AF) is the most common arrhythmia in clinical practice and will continue to increase given the advancing age of the population.[1] The increased mortality and morbidity associated with this arrhythmia[2] is widely appreciated with stroke being the most feared complication. Strokes secondary to underlying AF are often fatal; those who survive may be left with more disabling neurological deficit than other forms of ischaemic stroke. The management of AF can be broadly divided into rhythm vs. rate control strategies, combined with a risk assessment for prevention of thromboembolism. Echocardiography plays a critical role in defining the clinical context of the arrhythmia and therefore informs the clinician regarding the key issues of anticoagulation and overall cardiac management. Transoesophageal echocardiography (TOE) is used to exclude intracardiac thrombus to facilitate early cardioversion. Emerging technologies such as catheter ablation and left atrial appendage (LAA) occlusion have expanded the role of echocardiography, such that it is essential to achieve a high standard of cardiac imaging to optimize patient outcomes. The increasing prevalence together with the advancing technology makes AF an extremely important socioeconomic health issue. In this article, we concentrate on the role of echocardiography in the risk assessment and management of thromboembolic stroke.

Electrocardiographically characterized by low amplitude baseline oscillations called as Fibrillatory or 'F' waves and an irregularly irregular rhythm of ventricles with the rate of 300 to 600 beats per minute and they are variable in amplitude, shape and timing. The overall prevalence of Atrial Fibrillation in general population

is around 0.4% to 1%. For both men and women, prevalence and incidence of AF were disproportionately higher in developed nations as compared with the developing nations.[3] There are various risk factors which predisposes the patient to develop Atrial Fibrillation that includes Hypertensive heart Disease, Coronary Artery disease, Rheumatic valvular diseases, Hypertrophic and dilated Cardiomyopathy, Congestive cardiac failure, Pericarditis and Myocarditis, Congenital Heart Disease, Post cardiac surgery, Sick sinus syndrome. Some non-cardiac risk factors include Age, Hyperthyroidism, Alcohol intake, Chronic obstructive pulmonary disease, Obstructive sleep apnea, Diabetes mellitus, Smoking, Drugs - Theophylline and Familial. Electrocardiographic risk factors include left axis deviation, left ventricular hypertrophy, ischemic changes and Echocardiographic risk factors include left atrial enlargement, increased left ventricular wall thickness and decreased left ventricular fractional shortening. Various common complications associated with Atrial Fibrillation include Congestive cardiac failure. at rest approximately 20% of left ventricular stroke volume is by atrial contraction which will be lost in AF and hence LV dysfunction can occur.[4] The most common complication in AF is thromboembolism induced stroke. AF is associated with 5 fold increased risk of stroke than in unaffected population. Older patients are not only more prone to AF but their risk of stroke is considerably increased as compared to younger patients with AF.[5] In this background it is pertinent to know the clinical profile and etiological factors responsible for Atrial Fibrillation and echocardiographic profile in an institute to manage the patients in the hours of Emergency.

Material and methods

The present study was conducted in the Department of Cardiology, Patna medical college and Hospital, Patna Bihar, India for 15 months, after taking the approval of the protocol review committee and institutional ethics committee.

A total of 120 patients with Atrial fibrillation detected on ECG were include in this study . Patients were studied in detail with reference to age, sex, clinical features and history of present & past illness. Detailed Cardiovascular and Neurological examination was done to know the etiology and to assess for any evidence of thromboembolism. The aims and objectives are to assess the clinical profile and etiology of the patients presenting with Atrial Fibrillation and to perform Echocardiographic evaluation of patients with Atrial Fibrillation.

Inclusion criteria

Patients aged more than 20yrs and clinically and electrocardiographically proven Atrial Fibrillation cases were included in this study. It was diagnosed clinically by the presence of irregularly irregular pulse rate, pulse deficit of >10, S1 of variable intensity and by using 12 Lead ECG showing absence of P waves, presence of Fibrillatory waves that vary in size, shape and timing leading to irregular ventricular response.

Exclusion criteria

Patients suspected clinically to have atrial fibrillation later proved to have different arrhythmia electrocardiographically were excluded from this study.

All the patients who were enrolled in this study were subjected to routine laboratory investigations along with Lipid Profile, Thyroid Profile, MRI 3D Brain wherever applicable and then Echocardiography was done to evaluate the etiology of AF.

Results

Among the total 120 patients with Atrial Fibrillation enrolled in this study as shown in Table I, Mean Age of the patients was 65.34 ± 12.51 yrs and maximum were in the below 45 yrs age group (n = 103; 85.83%). Males were predominant in this study as 66.67 % (n = 80) and females were 33.33 % (n = 40). Among the various risk factors and co-morbidities, the presence of hypertension, diabetes mellitus, smoking, Alcohol were studied. 110 patients (91.67%) in this study were hypertensive, 26 patients (21.67%) were diabetic, 41 patients (34.17%) had a significant history of Alcohol consumption and history of smoking was present in 13 patients (10.83%). Metabolic Syndrome was present in 17 patients (14.17 %). CHA2DS2-VASc score of more than 2 was seen in 89.17% of the patients. Rheumatic heart disease was seen in 14 patients as the cause of AF. Table 1.

Symptomatology is shown in Table 2 and the most predominant presenting symptom was Dyspnea that was class IV in 75 patients (62.5%) followed by pedal edema in 41 patients (34.17%), Stroke in 23 patients (19.17%), Palpitations in 20 patients (16.67%), Typical Chest Pain in 7 patients (5.83%) and in 20 patients (10 %) AF was discovered incidently during work up of some intercurrent illness. Table 2

Table 1: Demographic profile and various characteristics of study population

Variables	No. of patients (n)	Percentage (%)
Age (yrs)		
Below 45	17	14.17
Above 45	103	85.83
Sex		
Male	80	66.67
Female	40	33.33

Risk factors		
Hypertension	110	91.67
Diabetes mellitus	26	21.67
Alcohol	41	34.17
Smoking	13	10.83
Rheumatic heart disease	14	11.67
Metabolic syndrome	17	14.17
CHA2DS2- VASc		
≤1	13	10.83
≥2	107	89.17

Table 2: Distribution according to symptomatology

Parameter	Number of patients (n)	Percentage (%)
Breathlessness	75	62.5
Palpitation	20	16.67
Chest pain	7	5.83
Pedal edema	41	34.17
Stroke	23	19.17
asymptomatic	12	10

On Echocardiographic evaluation as shown in Table 3, two groups were seen - Valvular AF group and Non Valvular AF group. It was found that Hypertensive heart disease (HHD) was the most common etiology among the non-valvular causes of AF in this study. It was seen in 73 patients out of 107 (68.22%) followed by Coronary artery disease (CAD) in 21 patients (19.63%), Dilated Cardiomyopathy (DCM) in 5 patients (4.67%) and 2 patient (1.87%) each of

congenital heart disease (CHD), Hypertrophic Obstructive Cardiomyopathy (HOCM), Chronic Obstructive Pulmonary Disease (COPD) and Lone AF. Among the cases of valvular AF of 13 patients, Mitral stenosis with Mitral regurgitation was the most common lesion found in 11 patients (84.62%). 11 patients (84.62%) out of 13 had severe Mitral Stenosis having valve area of <1.5 cm². Mean LA Size in this study was 48.15±10.05 mm

Table 3: Distribution according to Etiology of Non - Valvular AF group on Echocardiography

Etiology	Number of patients (n)	Percentage (%)
HHD	73	68.22
CAD	21	19.63
DCM	5	4.67
HOCM	2	1.87
CHD	2	1.87
COPD	2	1.87
Lone AF	2	1.87
Total	107	100

Regarding other parameters studied on Echocardiography as shown in Table 4, Ejection Fraction (EF) was found to be

more than 44% in 87 patients (72.5%) and less than 44% in 33 patients (27.5%) as evaluated in the study. Left ventricular

hypertrophy (LVH) was seen in 91 patients. Diastolic Dysfunction was seen in 19 patients (15.83%) out of 120. Regional wall motion abnormalities (RWMA) were

present in 25 patients and LA (left atrial) clot was seen in 11 patients (9.17%) and that too in cases of Valvular AF.

Table 4: Distribution according to various parameters assessed on echocardiography.

Echocardiography	No of patients (n)		Total (n)
	Present	Absent	
EF<44%	33	87	120
LVH	91	29	120
Diastolic Dysfunction	19	101	120
RWMA	25	95	120
LA Clot	11	109	120

As shown in table 5, the most common complication was found to be as Congestive cardiac failure in 69 patients (57.5%) followed by stroke in 23 patients (19.17%), Early Death occurred in 13 patients (10.83%) and no major complication was documented in 15 patients (12.5%). CHA₂DS₂-VASc scores

were calculated to assess the future risk of stroke occurrence in Non-valvular cases of AF. The score of 1 was present only in 6 patients (5%) out of 107 patients with Non-Valvular AF rest all had scores ≥ 2 i.e. requiring the use of chronic anticoagulation.

Table 5: Distribution according to complications of atrial fibrillation.

Complications	No of patients (n)	Percentage (%)
Congestive cardiac failure	69	57.5
Embolism	23	19.17
No complications	15	12.5
Death	13	10.83
Total	120	100.0

Discussion

Atrial Fibrillation is the most commonly encountered quivering or irregular heart beat (arrhythmia) in [7]. Our population, and it is the disordered supraventricular atria) event characterized by irregular heart rhythm, there by altered atrial electrical and mechanical function will occur, it will lead to significant economic burden to the society by causing morbidity and mortality. Atrial fibrillation is the most common arrhythmia whose incidence increases dramatically with age and is a significant source of disability and death in the elderly population. In a study done by N Vidya et al, mean age was found to be 47 yrs and males were predominant i.e. 55% and females were 45%.[6] In this

study mean Age of the patients was 65.34 ± 12.51 yrs. In a study done by Michael et al, Hypertension was an independent predictor of AF and was found in around 60-80% of AF population. In Framingham study also hypertension and diabetes were the significant independent predictors of atrial fibrillation after adjusting for age and other predisposing conditions. For men and women respectively, diabetes conferred a 1.4 and 1.6 fold risk and hypertension conferred a 1.5 and 1.4 fold risk after adjusting for other associated conditions.[8] In a study done by Vyssoulis comprising of 15,075 consecutive, non-diabetic patients with essential hypertension (age range: 40-95

years, 51.1% males), the prevalence of the Metabolic Syndrome varied from 31.7% to 47.8% and all the components of the criteria were associated independently with Atrial Fibrillation.[9] The CHA2DS2-VASc score stratified the patients by taking history of congestive heart failure, Hypertension, Diabetes Mellitus, Vascular Disease, Female sex (1 point each) and Age >75 yrs and Previous Stroke or TIA (2 points each). The score was more than 2 in 86% patients. Scores of ≥ 2 are considered to be at high risk for stroke occurrence. This had been reported that patients with Atrial Fibrillation are at five to seven fold greater risk of stroke than the general population and strokes secondary to Atrial Fibrillation have a worse prognosis than in patients without Atrial Fibrillation.[10,11]

In the present study dyspnea that was class IV in 75 patients (62.5%) followed by pedal edema in 41 patients (34.17%), Stroke in 23 patients (19.17%), Palpitations in 20 patients (16.67%), Typical Chest Pain in 7 patients (5.83%) and in 20 patients (10 %) AF was discovered incidently during work up of some intercurrent illness. Dyspnea was the most common presenting complaints of the patients enrolled in this study. According to a study done by Tischler et al, dyspnea was reported in 62% of patients, palpitations in 33% patients, and syncope in 12% patients, Flaker et al in his study observed that 78% patients had dyspnea and 11% had chest pain at presentation whereas Levey et al, reported that 54.1% patients had palpitations, 44.4% patients had dyspnea and 10.1% patients had chest pain. Fatigue was noted in 14.3% patients. Atrial fibrillation was of Permanent type in 57 patients (57%) followed by persistent AF in 17 patients (17%) and new onset in 16 patients (16%).[12-14]

In the present study 73 patients out of 107 (68.22%) followed by Coronary artery disease (CAD) in 21 patients (19.63%), Dilated Cardiomyopathy (DCM) in 5 patients (4.67%) and 2 patient (1.87%)

each of congenital heart disease (CHD), Hypertrophic Obstructive Cardiomyopathy (HOCM), Chronic Obstructive Pulmonary Disease (COPD) and Lone AF. Among the cases of valvular AF of 13 patients, Mitral stenosis with Mitral regurgitation was the most common lesion found in 11 patients (84.62%). 11 patients (84.62%) out of 13 had severe Mitral Stenosis having valve area of <1.5 cm². Mean LA Size in this study was 48.15 \pm 10.05 mm. Hypertension and atrial fibrillation are the two important public health priorities. The prevalence of them is increasing worldwide and the two conditions often coexist in the same patient. Hypertension and AF are strikingly related to an excess risk of cardiovascular disease and death. Hypertension ultimately increases the risk of AF, and because of its high prevalence in the population, it accounts for more cases of AF than other risk factors. Among patients with established AF, hypertension is present in about 60% to 80% of individuals. In this study also Hypertension was the most common etiology found in the Non - valvular AF group on Echocardiography followed by Coronary Artery Disease. In Framingham Study done by Kannel et al, maximum patients had hypertensive heart disease (47%) as the most common etiology of AF followed by Rheumatic heart disease (17%) followed by CAD in 10% patients.[15] In a study done by A. Banerjee et al, it was seen that EF measurement alone was not helpful in predicting the risk of stroke/ Thromboembolism in patients of Non Valvular AF with Heart Failure.[16] Presence of abnormal EF (LV systolic dysfunction) independently predicts the risk of stroke as shown by Atrial fibrillation investigators study.[17] It was observed in a study done by Mahmood ul Hassan that significant correlation was observed for LA clot in patients with AF and LA size \geq 45 mm,($p > 0.001$). Out of 1544 patients taken, the mean LA size was 43.82 \pm 2.12 mm. Atrial fibrillation was observed in 289 patients (18.7%).

Overall clot was seen in 224 (14.5%) patients. Left atrial appendage clot was seen in 202 (89.73%) and LA clot was seen in 9 patients (4.02%).[18]

The most common complication was found to be as Congestive cardiac failure in 69 patients (57.5%) followed by stroke in 23 patients (19.17%), Early Death occurred in 13 patients (10.83%) and no major complication was documented in 15 patients (12.5%). Atrial Fibrillation increases the risk of stroke, heart failure, and overall mortality.[19] Atrial fibrillation and congestive cardiac failure share similar risk factors, frequently coexist, and have additive adverse effects when occurring in conjunction. The association between AF and the development of CHF was analyzed in a study of 3288 patients diagnosed with AF at the Mayo Clinic. Twenty-four percent developed Heart Failure during a mean follow-up of 6.1 years, with an incidence of 44 per 1000 patient-years. A spike in the incidence of Congestive Heart Failure was seen early after the diagnosis of AF, with 7.8% of cases occurring within the first 12 months, and approximately 3% per year thereafter.[20]

Trough ton RW et al concluded that echocardiography provides vital information about cardiac function, complications, and prognosis in patients with AF. Modalities like Transesophageal Echocardiography and Intracardiac Echocardiography can help to guide ablation therapy and decisions related to cardioversion. The integrated use of echocardiography will be an important component in the optimal management of the looming AF epidemic.[21]

Conclusion

Increasing age and hypertension are associated with occurrence of AF. Hypertensive heart disease was the most common etiology in elderly age group. Presence of LVH or left atrial enlargement

in patients with hypertensive heart disease requires early management to improve the outcomes.

References

1. European Heart Rhythm Association; European Association for Cardio-Thoracic Surgery, Camm AJ, Kirchhof P, Lip GY, Schotten U, Savelieva I, Ernst S et al. Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). *Eur Heart J* 2010;31:2369 – 429. Epub August 29, 2010.
2. 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;98:946 –52.
3. Raja DC, Kapoor A. Epidemiology of Atrial Fibrillation-An Indian Perspective. *J Assoc Physicians India*. 2016;7-10.
4. Grogan M, Smith HC, Gersh BJ, Wood DL. Left ventricular dysfunction due to atrial fibrillation in patients initially believed to have idiopathic dilated cardiomyopathy. *Am J Cardiol*. 1992;69(19):1570- 3.
5. Sastry KBR, Kumar LS, Anuradha P, Raj B, Afzal MAM. Clinical profile and Echocardiographic findings in patients with Atrial Fibrillation. *IJSRP*. 2016,6(2):44-7.
6. Vidya N, Gupta AK, Mahmood Syed E, Malini K, Patiyal RK. Etiological profile and clinical presentation of patients with atrial fibrillation from a rural area of Bihar. *Natl J Med Res*. 2012;2(2):124- 7.
7. Nabauer M, Gerth A, Limbourg T, Schneider S, Oeff M, Kirchhof P, et al. The Registry of the German Competence NETwork on Atrial Fibrillation: patient characteristics and initial management. *Europace*. 2009;11(4):423-34.

8. Benjamin EJ, Levy D, Vaziri SM, D'agostino RB, Belanger AJ, Wolf PA. Independent risk factors for atrial fibrillation in a population-based cohort: the Framingham Heart Study. *Jama*. 1994;271(11):840-4.
9. Vyssoulis G, Karpanou E, Adamopoulos D, Kyvelou SM, Tzamou V, Michailidis A, et al. Metabolic syndrome and atrial fibrillation in patients with essential hypertension. *Nutr Metab Cardiovasc Dis*. 2013;23(2):109-14.
10. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation: a major contributor to stroke in the elderly: the Framingham Study. *Archives of internal medicine*. 1987;147(9):1561-4.
11. Miyasaka Y, Barnes ME, Bailey KR, Cha SS, Gersh BJ, Seward JB, et al. Mortality trends in patients diagnosed with first atrial fibrillation: a 21-year community-based study. *J Am College of Cardiol*. 2007;49(9):986-92.
12. Tischler MD, Lee TH, McAndrew KA, Sax PE, Sutton MS, Lee RT. Clinical, echocardiographic and Doppler correlates of clinical instability with onset of atrial fibrillation. *Am J Cardiol*. 1990;66(7):721-4.
13. Flaker GC, Fletcher KA, Rothbart RM, Halperin JL, Hart RG. Clinical and echocardiographic features of intermittent atrial fibrillation that predict recurrent atrial fibrillation. *Am J Cardiol*. 1995;76(5):355-8.
14. Lévy S, Maarek M, Coumel P, Guize L, Lekieffre J, Medvedowsky JL, et al. Characterization of different subsets of atrial fibrillation in general practice in France: the ALFA study. *Circulation*. 1999;99(23):3028-35.
15. Kannel WB, Abbott RD, Savage DD, McNamara PM. Epidemiologic features of chronic atrial fibrillation: the Framingham study. *New Engl J Med*. 1982;306(17):1018-22.
16. Banerjee A, Taillandier S, Olesen JB, Lane DA, Lallemand B, Lip GY, et al. Ejection fraction and outcomes in patients with atrial fibrillation and heart failure: the Loire Valley Atrial Fibrillation Project. *Eur J Heart Failure*. 2012;14(3):295-301.
17. Atrial Fibrillation Investigators: Atrial Fibrillation, Aspirin, Anticoagulation Study; European Atrial Fibrillation Study; Stroke Prevention in Atrial Fibrillation Study; Boston Area Anticoagulation Trial for Atrial Fibrillation Study; Canadian Atrial Fibrillation Study; Veterans Affairs Prevention in Atrial Fibrillation Study. Echocardiographic Predictors of Stroke in Patients with Atrial Fibrillation: A Prospective Study of 1066 Patients From 3 Clinical Trials. *Arch Intern Med*. 1998;158(12):1316-20.
18. ul Hassan M, Hussain C, Gul AM, ullah Jan H, Hafizullah M. Frequency of left atrial and appendage clot in patients with severe mitral stenosis. *J Ayub Med College Abbottabad*. 2010;22(2):40-2.
19. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Executive summary: heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation*. 2016;133(4):447-54.
20. Miyasaka Y, Barnes ME, Gersh BJ, Cha SS, Bailey KR, Abhayaratna W, et al. Incidence and mortality risk of congestive heart failure in atrial fibrillation patients: a community-based study over two decades. *Eur Heart J*. 2006;27(8):936-41.
21. Troughton RW, Asher CR, Klein AL. The role of echocardiography in atrial fibrillation and cardioversion. *Heart*. 2003;89(12):1447-54