

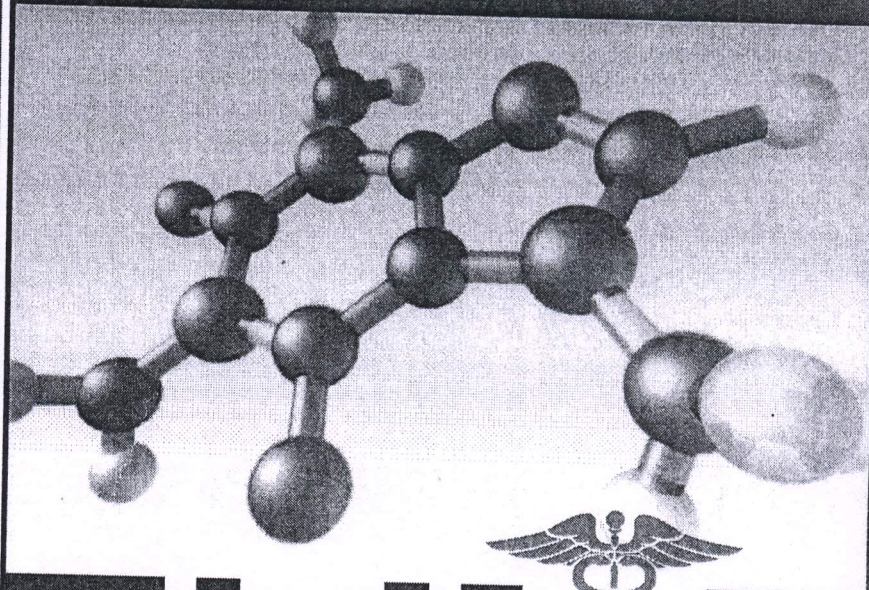
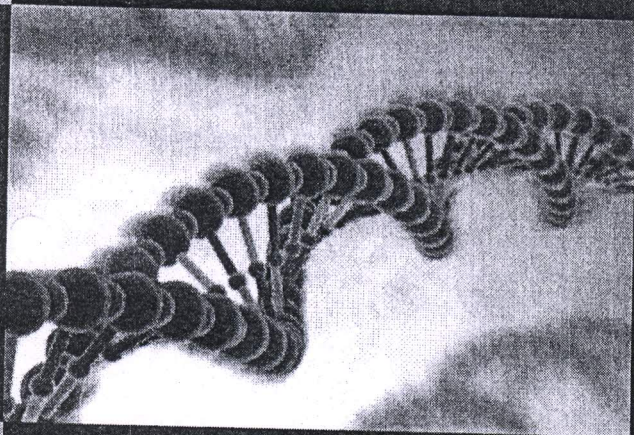


Spring Media Publishing

www.intern-med.com

ISSN 2224-4018

Vol 2 | Issue 4 | Oct-Dec 2014



Journal of Translational Internal Medicine

Official Publication of
International Society of Translational Sciences



Wolters Kluwer
Health

Medknow

A clinical, electrocardiography and echocardiography study of atrial fibrillation in a tertiary care teaching hospital

Vivek Gollahalli Changrashekar, Srikant R. Gadwalkar¹, Asha Basavareddy², Rakesh Basavareddy³

Department of Medicine, Sri Venkateshwara Medical College and Hospital, Ariyur, Pondicherry, ¹Department of Medicine, Vijayanagar Institute of Medical Sciences, Bellary, ²Department of Pharmacology, Sri Devaraj Urs Medical College, Tamaka, Kolar, ³Department of Medicine, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, India

ABSTRACT

Background and Objective: Atrial fibrillation (AF) is the most common sustained arrhythmia. It is marked by disorganized, rapid and irregular atrial contraction. The aim of our study is to determine various clinical presentations in patients with AF and to assess the underlying heart disease in patients with AF using electrocardiography (ECG) and echocardiography. **Subjects and Methods:** This study was undertaken at the Vijayanagara Institute of Medical Sciences, Bellary. It was a prospective, observational study conducted from December 2010 to June 2012. Detailed history was taken from the patients and they were examined according to the prepared proforma. **Results:** The age of the patients varied from 30 to 85 years. In the present study, the male to female ratio was almost equal, with 24 (48%) male and 26 (52%) female cases. Dyspnea was the most common symptom, followed by palpitations. The pulse deficit varied from 10 to 26 per minute. Rheumatic valvular heart disease was the most common etiology of AF observed in the present study. Mitral stenosis was the most common valvular lesion observed in patients with rheumatic heart disease. Congestive cardiac failure was the most common complication observed, followed by embolic phenomenon. Left ventricular enlargement was seen in 18 cases on chest X-ray. Left atrial enlargement was seen in 33 cases, where 24 cases were of chronic valvular rheumatic heart disease on 2D echocardiography. **Conclusion:** AF was the most commonly seen rheumatic heart disease, followed by ischemic heart disease. Dyspnea was the most common presenting complaint and congestive cardiac failure was the most common complication.

Key words: Atrial fibrillation, electrocardiography, echocardiography

Key Messages: The echocardiographic characteristics of persons who developed AF included larger left atrial and left ventricular dimensions and ventricular wall thickness and more mitral annular calcification. Each 5 mm increment in left atrial dimension increased AF risk 39%. A 5% decrement in left ventricular fractional shortening increased the risk by 34%. A 4 mm increment in left ventricular wall thickness increased AF risk by 28%. Mitral annular calcification doubled the risk.

Address for Correspondence:
Dr. Asha B. Reddy,
Department of Pharmacology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar - 563 101,
Karnataka, India.
E-mail: dr.ashareddy@gmail.com

Access this article online

Website:

www.intern-med.com

DOI:

10.4103/2224-4018.147745

Quick Response Code:



INTRODUCTION

Atrial fibrillation (AF) is associated with a wide variety of predisposing factors.^[1] In the developed world, the most common clinical diagnoses associated with permanent AF are hypertension and coronary artery disease.^[1] The presence of congestive heart failure markedly increases the risk of AF. The prevalence of AF in the adult

population doubles with each advancing decade of age, from 0.5% at age 50-59 years to 9% at age 80-89 years.^[1] AF is one of the most common complications of rheumatic heart disease. Previously, AF was thought to be one of the pathognomonic sign of mitral stenosis.^[2] One of the studies reports that AF is clearly related to age and was uncommon in the younger age group.^[3] Majority of the studies carried

out in western countries did not report rheumatic heart disease (RHD) as commonly being associated with AF.^[1,4-6] In India, the prevalence of RHD is high. In a study conducted among our people, RHD was observed in 58% of the cases of AF.^[7] This study was intended to find out the varied presenting symptoms of AF and also the possible underlying predisposing factors, both cardiac and noncardiac, with the help of 2D echocardiography, which is specifically used in studying valvular heart diseases associated with AF, left atrial size and presence of clots in the left atrium. If appropriate treatment is started earlier, AF rarely causes serious or life-threatening problems.

SUBJECTS AND METHODS

The study was conducted at the VIMS combined hospital, Bellary, from December 2010 to June 2012 and the protocol was approved by the Institutional Ethics Committee. The patients of either gender aged more than 18 years diagnosed with AF using 12-lead electrocardiograph (ECG) were included for the study after obtaining written informed consent. The ECG and echocardiography were performed and reported by senior consultant physicians. All these patients underwent detailed clinical examination and all essential laboratory tests including chest X-ray, ECG and echocardiography, routine blood examinations and patients suspected with hyperthyroidism and thyroid function tests were performed and recorded in the case report form (CRF). The diagnosis of hypertension was made according to the JNC 8 guidelines, when an average of two or more blood pressures (BPs) measured on at least two subsequent visits was consistently equal or more than 140/90 mmHg.^[8] Heart failure was diagnosed using the Framingham criteria, which consists of concurrent presence of two major criteria or one major and two minor criteria.^[9] Systolic dysfunction is defined as a left ventricular ejection fraction (LVEF) <40%.^[10] Dilated cardiomyopathy is characterized by enlargement of one or both ventricles accompanied by systolic and diastolic contractile dysfunction and symptoms of heart failure.^[11] Mitral valve area is calculated by tracing mitral valve orifice using a planimeter by 2D echocardiography. It is classified as mild (valve area >1.5 cm sq), moderate (1-1.5 cm sq) and severe (<1 cm sq).^[12] The left atrial size was measured by M mode in the parasternal long axis as per the American Society of Echocardiography recommendations. Left atrial dimensions were measured between the leading edge of the posterior aortic wall to the leading edge of the posterior left atrial wall at the end of systole.

RESULTS

In this present study of AF, the age of the patients varied from 30 to 85 years, with a mean age of 54.84 ± 17.49 years. The youngest patient was 30 years old and the

oldest patient was 85 years old. The maximum number of cases was seen between 60 and 79 years, which was 15 cases (30%). The male to female ratio was almost equal, with 24 (48%) male and 26 (52%) female cases. The most common presenting symptoms are shown in Figure 1. All the 50 cases had irregularly irregular pulse, with a varying rate from 74 to 128 per minute. The majority of cases (24) had pulse rate between 91 and 110 per minute.

All patients had pulse deficit more than 10. Thirty-six patients had pulse deficit <20. Fourteen patients had pulse deficit >20. The etiology of AF in various patients is shown in Table 1.

The types of valvular lesions in patients with RHD are shown in Table 2.

Table 1: Etiology of atrial fibrillation (AF)

Etiology of AF	Number of patients
Rheumatic heart disease (RHD)	25
Hypertension	6
Ischemic heart disease (IHD) + hypertension	6
IHD	4
Chronic obstructive pulmonary disorder (COPD)	3
Cardiomyopathy	3
Atrial septal defect (ASD)	2
Thyrotoxicosis	1

Table 2: Valvular lesions - Rheumatic heart disease (RHD)

Valvular lesions - RHD	Number of patients
Mitral stenosis (MS)	14
MS + mitral regurgitation (MR)	5
MR	2
MR + aortic regurgitation (AR)	1
MS + MR + AR	1
Aortic stenosis (AS) + AR	1
AR	1

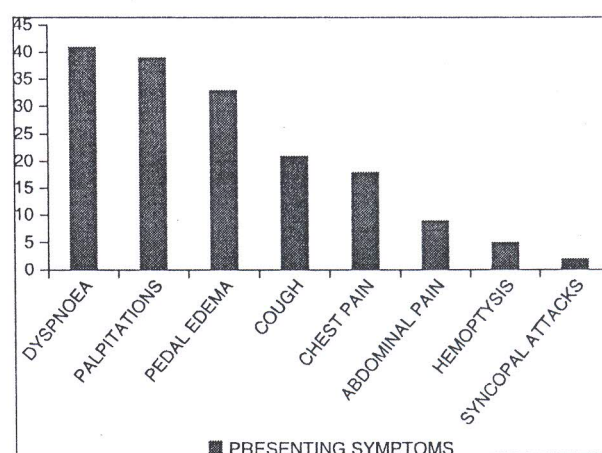


Figure 1: Presenting symptoms

P waves were absent in all 50 cases. Left ventricular hypertrophy was seen in eight cases, right ventricular hypertrophy in two (4%) cases, evidence of ischemic heart disease in eight cases, left bundle branch block in one case and right bundle branch block in three cases.

In the above study, left atrial enlargement was seen in seven cases, left ventricular enlargement in 18 cases, left ventricular enlargement with left atrial enlargement in 12 cases, left atrial enlargement with right ventricular enlargement in seven cases, both right atrial and ventricular enlargement in two cases, emphysema with right atrial enlargement in three cases and normal X-ray in one case. Complications associated with AF are shown in Table 3.

DISCUSSION

This present study included 50 patients diagnosed with AF who were examined and investigated in detail with regard to history, clinical data of these cases with reference to etiological factors, complications, electrocardiographic and echocardiography findings. In our study, the age of the patients varied from 30 to 85 years, with a mean age of 54.84 ± 17.49 years. The maximum numbers of cases were seen between 60 and 79, years which was 15 cases (30%). The mean ages of the AF patients observed in two Indian studies by Sharma *et al.* and Singh *et al.* were 40 ± 7 years and 57.33 years, respectively.^[13,14] The prevalence of AF was 0.5% for the group aged 50-59 years, rising to 8.8% in the group aged 80-89 years.^[15,16] Because rheumatic heart disease accounts for the majority of cases of AF in our population, an incidence at an earlier age was expected. An increase in the incidence with advancing age was observed in the present study. The incidence of AF did not differ significantly between the genders. Among the symptoms, the most common symptom was dyspnea (41), followed by palpitations (39), swelling of the limbs (33) and chest pain (18). These findings were similar to the study by Singh *et al.*^[14] All the 50 cases had irregularly irregular pulse, with a varying rate from 74 to 128 per minute, and were associated with pulse deficit.

The major cause for AF was RHD (25 cases), followed by ischemic heart disease with hypertension (6), only hypertension (6) and ischemic heart disease alone (4). An Indian study reported 91.61% of AF to be secondary to

chronic rheumatic valvular heart disease, 5.94% due to coronary artery disease and the rest due to miscellaneous causes.^[17] The Framingham study identified RHD and cardiac failure as the most predictive precursor of AF.^[11] Another retrospective study performed by Davidson *et al.* on 704 consecutive cases of AF reported atherosclerotic cardiovascular disease (55%), including diagnosed cases of myocardial infarction, hypertensive heart disease and coronary artery disease as the most frequent causes associated with this arrhythmia.^[18] The incidence of rheumatic fever is decreasing in developed countries, while in India it still accounts for 30-45% of all cardiac cases in hospital practice as reported by Levy *et al.*, while another study had observed that valvular heart disease was present in about 20-23% of AF patients.^[19,20] This fact was further substantiated by the observation in the present study.

Among the complications in AF, 40 (80%) cases developed congestive cardiac failure, which was in contrast to the ALPHA and Sharma *et al.* studies where only 38% and 30% patients, respectively, showed congestive cardiac failure.^[20,21]

ECG showed a rate varying from 74 to 180 per minute, and the maximum rate was 90-110 per minute in 22 (44%) cases. The rhythm was irregularly irregular in all the 50 cases (100%). P waves were absent in all 50 cases (100%) and QRS complexes were normal, but irregular in time and sometimes varying in amplitude. Chest X ray showed left ventricular enlargement (18 cases), left atrial enlargement (7), left ventricular enlargement with left atrial enlargement (12), left atrial enlargement with right ventricular enlargement (7), right atrial enlargement with right ventricular enlargement (3), emphysema (3) and normal X-ray in one case. The echocardiography showed left atrial enlargement in 33 cases and chronic valvular RHD in 25 cases. A study performed by Palle Petersen *et al.* correlated duration of AF with left atrial size and observed that in cases with AF of short and long duration, the mean left atrial size had increased significantly ($P = 0.001$). Pulmonary arterial hypertension was seen in 12 (24%) cases with mitral valvular disease. The Framingham study has examined the echocardiographic predictors of AF. Each 5 mm increment in left atrial dimension increased AF risk 39%, 5% decrement in left ventricular fractional shortening increased the risk by 34%, 4 mm increment in left ventricular wall thickness increased AF risk 28% and mitral annular calcification doubled the risk. Those with two or more of the foregoing echocardiographic abnormalities had a four-fold greater risk than those free of them all. Our findings correlated with these risk factors.

Table 3: Complications with atrial fibrillation (AF)

Complications with AF	Number of patients
Congestive cardiac failure (CCF)	40
Cor pulmonale	3
Cerebrovascular accident (CVA)	2
Superior mesenteric arterial ischemia	1
None	4

CONCLUSIONS

In the present study, AF was more common in the elderly compared with western studies. No significant difference was found with respect to gender. Dyspnea was the most common symptom, followed by palpitations. Rheumatic valvular heart disease was the most common etiology of AF, with mitral stenosis as the most common lesion. Congestive cardiac failure was the most common complication observed, followed by embolic phenomenon.

REFERENCES

1. Kannel WB, Abbott RD, Savage DD, McNamara PM. Epidemiologic features of chronic atrial fibrillation. The Framingham study. *N Engl J Med* 1982;306:1018-22.
2. Lip GY, Beevers DG. History, Epidemiology and Importance of atrial fibrillation. *BMJ* 1995;311:1361-3.
3. Deverall PB. Incidence of systemic embolism before and after mitral valvotomy. *Thorax* 1968;23:530-6.
4. Adell Cullel T, Samaniego Samaniego F, Casals Beistegui C, Maymó Pijuan N, Fandos Olona J, Juncadella García E. Total arrhythmia due to atrial fibrillation. The primary care approach. *Aten Primaria* 1993;11:333-6.
5. Aiberg H. Atrial fibrillation. A review of 463 cases from Philadelphia General Hospital from 1955 to 1965. *Acta Med Scand* 1968;184:425-31.
6. Rich EC, Siebold C, Campion B. Alcohol-related acute atrial fibrillation. A case-control study and review of 40 patients. *Arch Intern Med* 1985;145:830-3.
7. Raman TK. Auricular Fibrillation. *Indian Heart J* 1951;39:289-91.
8. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA* 2014;311:507-20.
9. Ho KK, Pinsky JL, Kannel WB, Levy D. The epidemiology of heart failure: The Framingham study. *J Am Coll Cardiol* 1993;22(4 Suppl A):6-13A.
10. Runge MS, Ohman M. *Netter's Cardiology*. 1st ed. Teterboro, New Jersey: Icon Learning Systems LLC; 2004.
11. Hughes SE, McKenna WJ. New insights into the pathology of inherited cardiomyopathy. *Heart* 2005;91:257-64.
12. Vahanian A, Baumgartner H, Bax J, Butchart E, Dion R, Filippatos G, et al; Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology; ESC Committee for Practice Guidelines. Guidelines on the management of valvular heart disease: The Task force on the Management of Valvular heart disease of the European Society of Cardiology. *Eur Heart J* 2007;28:230-68.
13. Sharma S, Joshi S, Gupta A. Prospective study of atrial fibrillation in a large industrial hospital: Therapeutic implications. *Indian Heart J* 2002;23:109-13.
14. Gurpal S, Nayar SB. Study of left atrial size in atrial fibrillation. *Indian Heart J* 2002;36:276-81.
15. *Heart disease. A Textbook of Cardiovascular Medicine*. Eugene Braunwald. 4th ed, Saunders Publisher, United States of America (USA) Vol. 2. 1992. p. 1683-4.
16. Prystowsky EN, Benson DW Jr, Fuster V, Hart RG, Kay GN, Myerburg RJ, et al. Management of patients with atrial fibrillation. A Statement for Healthcare Professionals. From the Subcommittee on Electrocardiography and Electrophysiology, American Heart Association. *Circulation* 1996;93:1262-77.
17. Prakash SK, Chugh SK. Atrial fibrillation in women. *J Am Physicians India* 1973;21:953-5.
18. Davidson E, Weinberger I, Rotenberg Z, Fuchs J, Agmon J. Atrial fibrillation. Cause and time of onset. *Arch Intern Med* 1989;149:457-9.
19. Levy S. Atrial fibrillation, the arrhythmia of the elderly, causes and associated conditions. *Anadolu Kardiol Derg* 2002;2:55-60.
20. Levy 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. The College of French Cardiologists. *Circulation* 1999;99:3028-35.
21. Henry WL, Morganroth J, Pearlman AS, Clark CE, Redwood DR, Itscoitz SB, et al. Relation between echocardiographically determined left atrial size and atrial fibrillation. *Circulation* 1976;53:273-9.

How to cite this article: Changrashekar VG, Gadwalkar SR, Basavareddy A, Basavareddy R. A clinical, electrocardiography and echocardiography study of atrial fibrillation in a tertiary care teaching hospital. *J Transl Intern Med* 2014;2:168-71.

Source of Support: NIL. **Conflict of Interest:** NIL.