



## STUDY OF CLINICAL, ETIOLOGICAL AND ECHOCARDIOGRAPHIC PROFILE OF PATIENTS WITH ATRIAL FIBRILLATION IN A TERTIARY CARE HOSPITAL IN EASTERN INDIA

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### ABSTRACT

Atrial Fibrillation (AF) is the most common sustained arrhythmia in clinical practice. In our country, most of the data related to AF has been derived from international studies with an Indian cohort. We studied etiology, left atrial size and the incidence of left atrial appendage clot in patients with atrial fibrillation at our institution so that guidelines could be formulated to manage the patients of AF in the hours of emergency.

The study population consisted of 203 hemodynamically stable patients with AF over a period of 1 year. After getting ethical committee clearance, appropriate clinical examination and investigations including detailed 2D echocardiography were carried out.

Mean age of the patients in our study was  $42.6 \pm 13.4$  years. Maximum number of patients was in the age group of 20-39 years (42.4%). Majority were females (65.5%). The most common symptom was shortness of breath (64.5%) followed by palpitation (59.6%). 57.6% cases were due to RHD and 13.8% due to systemic hypertension. Most common Valvular abnormality was found to be combined MS and MR (43.6%) followed by isolated MS (22.2%). The mean LA diameter was  $46.3 \pm 7.0$  mm. Out of 117 RHD patients, 42.7% had severely abnormal LA diameter. LA clot was present in only 4.9% of the patients who all had RHD. 7.4% had some embolic complications. Mean LA diameter was significantly different between RHD and non-RHD cases ( $48.97 \pm 7.5$  mm vs  $42.66 \pm 4.1$  mm). There was a significant association between severity of MS and LA diameter. No significant difference was found between different category of MV abnormality and mean LA diameter. There was significant increase in the rate of heart failure with increase in LA diameter abnormality.

**KEYWORDS :** atrial fibrillation, rheumatic heart disease, mitral stenosis, eastern India

### INTRODUCTION

Atrial Fibrillation (AF) is the most common arrhythmia and was first demonstrated on electrocardiography more than a century ago. [1] AF is a tachyarrhythmia characterized by bizarre atrial electrical activity with no effective atrial contraction and increased ventricular rate leading to ventricular dysfunction with reduced output, formation of thrombus in atrium leading to cerebrovascular accident and thromboembolic events. [2]

Although accurate worldwide estimates are lacking, calculations suggest that  $\geq 1\%$  of the adult population is affected in the developed world. [3, 4] In our country, there is virtually no data on AF, most of the data that has been derived is from international studies [5] with an Indian cohort.

Western studies indicate that most common underlying etiologies are hypertensive heart disease and coronary artery disease. [2] In India, rheumatic heart disease (RHD) still remains the predominant etiology of AF as documented by a small study from a rural population from the Himalayan hills (n = 137) in which 61.31% patients had AF of RHD etiology. [6]

### MATERIALS AND METHODS:

Our study was a cross sectional study with a sample size of 203. The study population consisted of hemodynamically stable patients with AF coming to the department of Cardiology, SCBMCH, Cuttack from Nov 2017 to Oct 2018.

Institution Ethics committee clearance was obtained. After obtaining informed consent from all subjects, detailed clinical examination, routine blood investigations, Chest X-Ray and ECG was done. Each subject was analyzed with conventional 2D ECHO, M MODE and Color Doppler to find out rheumatic heart disease, coronary heart diseases, congenital heart diseases, hypertensive heart disease, cardiomyopathies.

Evaluation of all 4 valves by 2D Echo was done in detail. Regurgitant and stenotic lesions were graded as per ASE recommendations. In patients with a cardioembolic stroke, a 2D TEE was done to search for clots particularly in LA appendage and presence of spontaneous echo contrast.

### INCLUSION CRITERIA-

1. Patients aged more than or equal to 18 years.
2. Patients with clinically and electrocardiographically proven atrial fibrillation
3. Hemodynamically stable patients.

### EXCLUSION CRITERIA-

1. Patients with atrial arrhythmias other than atrial fibrillation.
2. Hemodynamically unstable patients.
3. Patients with poor transthoracic echo window in who required echo parameters were difficult to obtain.
4. Patients with sepsis, multiple organ dysfunction syndrome and those who are on ventilators were excluded.

### STATISTICAL ANALYSIS

The distribution of different presentations of AF is provided as % with 95% confidence interval. Distribution of etiologies of AF is provided as %. Different parameters of Transthoracic Echocardiography are provided in %.

The collected data were analyzed with IBM SPSS statistics software 26.0 Version.

To describe the descriptive statistics of the data collected, frequency & percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. In case of small number of observations, median with interquartile range was calculated.

To find the significant difference between the bivariate samples in Independent groups the unpaired student t- test was used. To find the significance in categorical data, Chi-Square test, ANOVA and Mann Whitney U test was used. In all the above statistical tools the probability value <0.05 is considered as significant level.

**RESULTS**

**Demographic Profile:**

Maximum patients were found in 20-39 years followed by 40-59 years age. The mean age was 42.6 ± 13.4 years. Majority were female patients (65.5%). Most of the male patients belong to age group 40-59 years while in females 20-39 years was the group with maximum frequency. There was no significant association between age group with gender

**Clinical Profile:**

It was found that patients are presenting with single or multiple symptoms. The most common symptom was shortness of breath which manifested in about 2/3<sup>rd</sup> cases (64.5%) and the next frequently occurring symptom was palpitation (59.6%). Other presenting symptoms were chest pain, fatigue, syncope and weakness of limb. [Table 1]

Symptoms (N = 203)	No	%
Shortness of breath	131	64.5
Chest pain	56	27.6
Palpitation	121	59.6
Syncope	11	5.4
Fatigue	44	21.7
Weakness of limbs	4	2.0

**Etiology:**

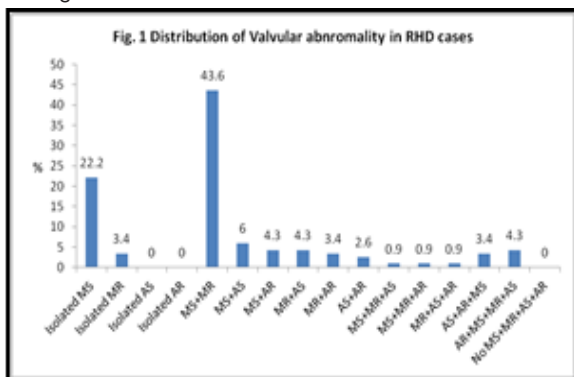
The most common etiology was RHD found among 57.6% cases followed by systemic hypertension (13.8%) and degenerative valvular heart disease (8.9%), coronary artery diseases (5.9%) and hyperthyroidism (3.4%).

Other etiologies that appear in small proportions were dilated cardiomyopathy, COPD, atrial septal defect etc. [Table 2]

Etiology (N = 203)	No	%
Systemic hypertension	28	13.8
Rheumatic Heart Disease	117	57.6
Coronary heart disease	12	5.9
Chronic obstructive pulmonary disease	6	3
Hyperthyroidism	7	3.4
Undetermined OR Lone AF	4	2.0
Dilated cardiomyopathy	7	3.4
Degenerative valvular heart disease	18	8.9

**Valvular abnormality among RHD patients:**

The most common Valvular abnormality was found to be MS+MR with a share of (43.6%) cases followed by isolated MS (22.2%). There were different kinds of Valvular abnormality with different combinations of MS, AS, MR and AR. [Fig 1]



**LA diameter:**

The mean LA diameter was 46.3 ± 7.0 mm and median was 44 mm with IQR 41 to 50 mm and range 36-65 mm. Among 117 RHD cases the mean LA diameter was 48.97 ± 7.5 mm and among 86 non-RHD cases it was 42.66 ± 4.1 mm. Mean LA diameter was significantly different between RHD and non-RHD (p=0.000). [Table 3]

LA Diameter in mm	No.	%
Normal (30-40)	4	3.4
Mildly abnormal (41-46)	29	24.8
Moderately abnormal (47-52)	34	29.1
Severely abnormal (>=53)	50	42.7
Total	117	100

**LA clot and embolic complications:**

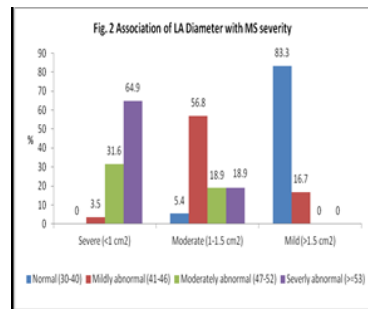
LA clot was present in only 4.9% of the patients (n= 10). All of them had RHD with severe MS. 8 (80%) of them had severely abnormal and 2 (20%) moderately abnormal LA diameter.

15 out of 203 patients (7.4%) had some embolic complications. 12 of these were non fatal strokes. 3 had peripheral embolisation.

66.7% (n=10) of patients with embolic complication had RHD and 33.3% were non RHD cases (n=5). All 10 RHD cases had evidence of LA clot by TTE/TEE or both.

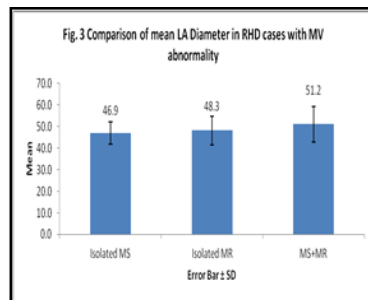
**LA diameter and severity of MS:**

Out of 100 MS cases, there were 57 severe, 37 moderate and 6 mild cases of MS. In 57 severe MS cases, 37 (64.9%) had severely abnormal, 18 (31.6%) had moderately abnormal and 2 (3.5%) had mildly abnormal LA diameter. In 37 moderate MS cases, 21 (56.8%) had mildly abnormal, 7 (18.9%) had moderately abnormal, 7 (18.9%) had severely abnormal and 2 (5.4%) cases had normal LA diameter. In 6 mild MS cases, 5 (83.3%) cases had normal and 1 (16.7%) had mildly abnormal LA diameter. There was a significant association between severity of MS with severity of abnormality of LA diameter (p=0.000).



**Mean LA diameter in RHD cases and type of MV abnormality:**

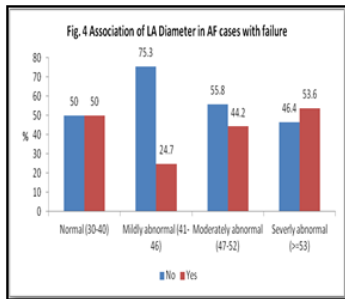
There was no significant difference found between different category of MV abnormality and mean LA diameter among RHD cases (ANOVA p=0.057). [Fig 3]



**LA diameter in AF cases and heart failure:**

In our study, out of 81 patients with failure, LA size was in the

normal range in 11.1% (n=9) of the patients, 23.4% (n=19) in the mildly abnormal range, 28.3% (n=23) in moderately abnormal range and 37% (n=30) in the severely abnormal range. Out of 122 patients without failure, LA size was normal in 7.3% (n=9) of the patients, mildly abnormal in 47.5% (n=58), moderately abnormal in 23.7% (n=29) and severely abnormal in 21.3% (n=26). There were significant increase in the rate of heart failure with increase in LA diameter abnormality (p=0.005). [Fig 4]



**DISCUSSION**

This study included 203 patients of various etiologies. It also included a detailed echocardiographic study to determine the underlying structural heart disease. The LA diameter, probably the most important determinant in AF was also studied.

**AGE:** The much younger age distribution is because most patients (57.6%) had RHD whereas in western studies HTN and CHF accounted for about 65% of cases.

**GENDER:** Male patients belonged to higher age group than females owing to the higher prevalence of RHD among females (66.2%) than males (41.4%). this result conforms with the previous study by Dushyant S., et al[7] and Diker et al. [8]

**SYMPTOMS:** Predominant symptom was shortness of breath (64.5%), followed by palpitation (59.6%) and chest pain (27.6%). Many patients had multiple symptoms. There was no significant difference in the proportion of heart failure between the RHD (42%) and non-RHD (37%) groups (p=0.502). This is in variation with the study done by Maisel WH. et al., who found that failure was significantly more common in the RHD group. [9]

**ETIOLOGY:** RHD (57.6%) was the most common etiological factor followed by HTN (13.8%). This result conforms to previous studies by Kannel WB., et al and Diker E., et al. [10, 8] Etiology of AF in comparison with various studies:

	No. of pts.	RHD%	SHt%	CAD%	Hyperthyroid%	Lone AF %
Present study	203	57.6	13.8	5.9	3.4	2
Lewis et al [11]	73	64	-	-	-	
Kannel et al [12]	98	18	38	10	-	31
Prystowsky et al [13]	285	4	56	19	11	35
Singh Ret al [14]	110	60	11.8	3.64	3.64	0.9

Amongst cases due to RHD, overall MS was more common than MR probably due to additional pressure load on LA that occurs in patients with MS. This results in fibrosis and inhomogeneous disarray that disturbs impulse propagation in the atria.

**EMBOLIC COMPLICATION:** In the Framingham study,

patients with MS and AF had a 17 fold increase of stroke as against a 5 fold increase in patients with AF in absence of MS [15]. This is due to the increase in blood stasis in LA in case of Rheumatic MS which increases the thromboembolic risk. In our study all patients with LA clot had severe MS. The correlation between severely abnormal LA diameter and presence of LA clot in this study is in unison with study done by Singh R et al. [14]

**ECHOCARDIOGRAPHIC PROFILE:**

**Severity of lesions:** In this study, most of the patients (57%) had severe MS. As the severity of MS increases, the hemodynamic strain on LA increases; which in turn increases the likelihood of initiation and perpetuation of re entrant pathways. There was no correlation between the degree of MR and rate of occurrence of AF. This conforms to the report by Diker et al. [8]

**LA diameter:** It has been identified to be the most important differing parameter between patients with and without AF. The mean left atrium diameter was significantly different between RHD and non-RHD cases (p=0.000). There was a significant association between severity of MS with severity of abnormality of LA diameter (p=0.000). This conforms to the findings by Flaker et al. [16], Henry WL et al. [17] and Cabin HS et al. [18].

In spite of LA size in isolated MR being larger, the incidence of AF was higher in MS. This, as stated earlier was probably due to the additional pressure load on LA in patients of MS. This also means that though LA diameter is the most important differing parameter between patients with and without AF, it is not the only significant determinant. The type of valvular involvement is also important.

The mean LA diameter in patients with isolated Aortic Valve disease (32 mm) and non RHD cases (42.6 mm) in spite of being in AF was significantly smaller than RHD MS or MR cases. This means factors other than hemodynamic stress on the LA operated to cause AF in these patients. Most of these patients had either systolic or diastolic dysfunction of LV.

LA enlargement has been proposed as a barometer of diastolic burden and a predictor of common cardiovascular outcomes, such as atrial fibrillation, stroke, congestive HF, and cardiovascular death. There were significant increase in the rate of heart failure with increase in LA diameter abnormality in our study (p=0.005)

**LIMITATIONS**

1. Hemodynamically unstable patients were excluded in our study. So the relationship between LA clot and LV dysfunction could not be completely assessed.
2. TTE was used in our study on all patients and TEE was carried out only on patients with embolic complications. TTE has low sensitivity of detecting LA clot; this was the reason for less number of patients with LA clot, in our study.

**CONCLUSIONS**

1. In our study, Rheumatic Heart Disease is the commonest cause of AF followed by systemic hypertension and degenerative valvular heart disease.
2. The maximum prevalence of AF in this study is in the 3<sup>rd</sup> and 4<sup>th</sup> decades of life due to higher prevalence of RHD. However, patients with non rheumatic etiology in our study presented mostly in 5<sup>th</sup> and 6<sup>th</sup> decade.
3. Female patients are more common than male patients. Patients with AF of rheumatic etiology are mostly females and that of non rheumatic etiology are mostly males.
4. Shortness of breath is the commonest presenting symptom of AF followed by palpitations.

5. Embolic complication is seen in 7.4% of patients.
6. Combined MS and MR is the commonest valvular lesion causing AF. Isolated MS is more common than isolated MR.
7. Left Atrial enlargement is seen in most of the patients, so LA diameter could be a predictor of AF. But it is not the sole determinant.
8. Patients with Left atrial enlargement are more prone to develop LA clot.

#### CONFLICTS OF INTEREST:

None of the authors have any conflicts of interest to declare.

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