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## Assessment of etiological, clinical and echocardiographic profile of cases with atrial fibrillation

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### Abstract

Atrial fibrillation (AF) is commonly encountered cardiac arrhythmia accounting for one-third of the total admissions for cardiac rhythm disturbances and is associated with significant morbidity and mortality. Echocardiography is the best method to find out the causes for the development of atrial fibrillation. This study was aimed to assess the clinical and echocardiographic profile of atrial fibrillation and its associated complications. A total of 120 cases of both genders (males 62 & females 58), clinically diagnosed with atrial fibrillation between age group 21-70 years were recruited. Study participants were subjected to detailed physical, systemic, radiological (chest X-ray PA view, transthoracic ECG) and laboratory investigations (blood glucose, thyroid function tests). Majority cases were in belonging to 4<sup>th</sup> and 5<sup>th</sup> decades of age. Dyspnea (90) was a common symptom followed by palpitation (39), fatigue (18), chest pain (10) and syncope (5). The CHA2DS2-VASc score was above 2 in 64.1%, which indicates a high risk for stroke occurrence. Among 54 RHD cases, 44.4% cases had mitral stenosis, followed by MS+MR in 24.07%, MS+AS+AR in 14.8% cases, MS+MR+AS+AR in 7.40% cases and S/P MVR in 9.25% cases. Rheumatic heart disease (45%) is the most common etiological factor associated with atrial fibrillation followed by hypertension (23.3%) and coronary artery disease (18.3%). The Left atrial enlargement was seen in study participants and a structural abnormality in echocardiography was observed.

**Keywords:** atrial fibrillation (AF), electrocardiography, rheumatic heart disease, size of left atrium, left ventricular hypertrophy

### Introduction

Atrial fibrillation (AF) is commonly encountered cardiac arrhythmia in 1-2% of the general population, associated with significant morbidity and mortality, where there is uncoordinated activation of atrium leading to mechanical dysfunction of the heart<sup>[1, 2]</sup>. Atrial fibrillation is characterized by unsystematic atrial activation and clumsy contraction. AF is clinically confirmed as an irregularly irregular pulse with a varying pulse rate from normal range to 200 and pulse deficit >10 beats<sup>[3]</sup>.

The prevalence of AF is rising globally and approximately 0.4% of the general population was affected with AF<sup>[4]</sup>. AF is associated with an increase in the risk of stroke by fivefold and the risk of all-cause mortality by twofold<sup>[5]</sup>.

Electrocardiography findings in atrial fibrillation exhibit an irregularly irregular ventricular rhythm, 'p' wave may be absent or coarse fibrillatory waves may be present<sup>[6]</sup>. Majority cases with AF are relatively asymptomatic, can have profoundly limiting symptoms due to rapid or slow basal ventricular rates, a rapid cardio accelerator response to physical exercise, beat to beat irregularity with associated palpitations and the loss of atrial systolic contribution to ventricular filling. Early identification of causes for AF can help the clinicians to develop appropriate treatment strategies. Echocardiography is the best method to find out the causes for the development of atrial fibrillation. The present study was designed to assess the clinical and echocardiographic profile of atrial fibrillation and its associated complications.

### Materials and Methods

The present cross-sectional study was conducted in the Department of General Medicine at MNR Medical College and Hospital, Sangareddy from April 2019 to October 2020. A total of 120 clinically diagnosed with atrial fibrillation and detected with ECG between 21 to 70

years were recruited. Cases exhibit the features such as erratically irregular pulse, lacuna of pulse >10, absence of ‘a’ wave in jugular venous pulsation, S1 of variable intensity on auscultation was considered. The written informed consent was obtained from all the study participants and the study protocol was approved by the institutional ethics committee. Cases confirmed with atrial fibrillation by ECG, with congenital heart disease, cardiomyopathies, history of coronary artery diseases were included. Cases with other systemic complications, below 20 years of age were excluded. All the study participants were subjected to detailed physical, systemic, radiological (chest X-ray PA view, transthoracic ECG) and laboratory investigations (blood glucose, thyroid function tests). Study participants were grouped by Enlargement of left atrium size according to American society of echocardiography.

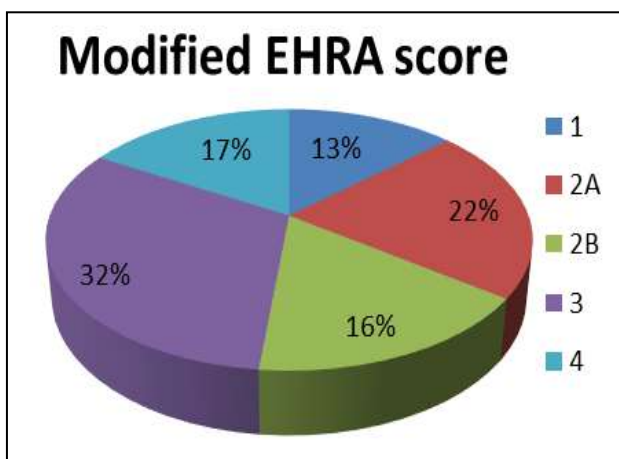
**Table 1:** Grouping of LA size severity by American society of echocardiography.

	Normal	Mild	Moderate	Severe
Male	<4.1	4.1-4.6	4.7-5.1	>5.1
Female	<3.9	3.9-4.2	4.3-4.6	>4.6

The SPSS version 23 software was used to carry out statistical analysis relevant to the study. Descriptive statistics were used to represent values in percentages. Study variables were analysed by chi-square test. A p-value of < 0.05 was considered statistically significant.

**Results**

A total of 120 cases with 62 male and 58 female were recruited. Majority cases were in between 31-40 years (27.5%), followed by 25.8% between 41-50 years, 23.3% between 51-60 years, 12.5% between 21-30 years and 10.8% between 61-70 years. Majority cases had dyspnea (90) as common symptom followed by palpitation (39), fatigue [18], chest pain [10] and syncope [5]. No symptoms were observed in 8 cases.



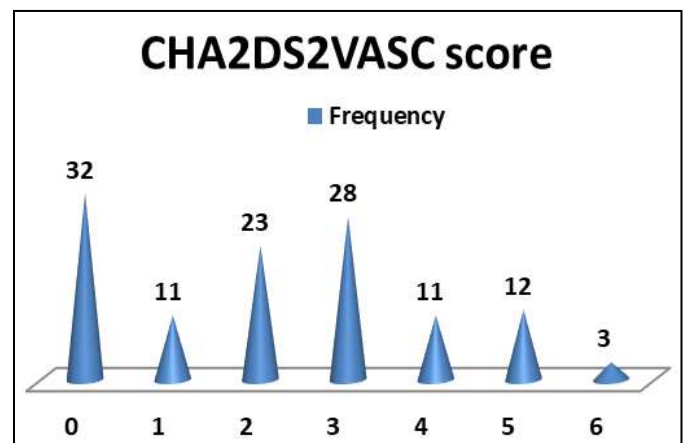
**Graph 1:** Distribution of cases as per modified EHRA score.

Among the study cases, most common complication associated with atrial fibrillation was heart failure in 30% cases and thromboembolism in 21.6% cases. Among the

cases with thromboembolism, 65.3% cases had CVA and 34.6%.

**Table 2:** Distribution according to etiological factors associated with atrial fibrillation.

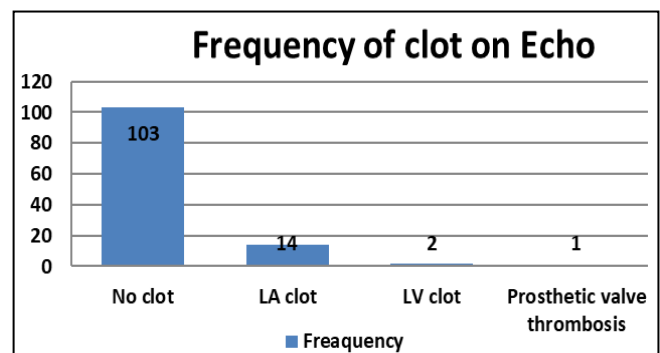
Etiological factor	Atrial fibrillation (n=120)	Heart failure (n=36)	CVA (n=17)
CAD	18.3%	33.3%	08 (47.05%)
RHD	45%	47.2%	06 (35.2%)
DCM	2.50%	2.7%	01 (5.8%)
HCM	1.6%	-	-
COPD	1.6%	5.5%	-
Hypertension	23.3%	11.1%	02 (11.7%)
Hypothyroidism	-	5.5%	-
CAD & Hypertension	4.16%	-	-
Subclinical hypothyroidism	2.5%	-	-
Lone AF	0.8%	-	-



**Graph 2:** CHA2DS2VASC score among non-vascular atrial fibrillation.

**Table 3:** Distribution of valve lesion among RHD (N=54).

RHD	Frequency
MS	24 (44.4%)
MS+MR	13 (24.07%)
MS+AS+AR	08 (14.8%)
MS+MR+AS+AR	04 (7.40%)
S/P MVR	05 (9.25%)



**Graph 3:** Frequency and percentage of clot on ECHO.

**Table 4:** Details of clot on echo and heart rate, CVA and peripheral embolism.

	Clot on Echo			
	No clot	LA clot	LV clot	PR V clot
<b>Heart rate group</b>				
<100 (n=41)	-	02 (4.8%)	02 (4.8%)	-
100-400 (n=64)	-	11 (17.1%)	0	01 (1.56%)
>140 (n=15)	-	05 (33.3%)	02 (13.3%)	03 (20%)
<b>CVA</b>				
Present	09	05	2	1
Absent	94	09	0	0
<b>Peripheral embolism (n=26)</b>				
Present	18	08	0	0
Absent	85	06	02	01

**Table 5:** Severity of Left ventricular systolic dysfunction and details of Left ventricular hypertrophy.

Left ventricular systolic dysfunction	Frequency
<b>Distribution of severity</b>	
Normal	100
Mild	07
Moderate	05
Severe	08
<b>Left ventricular hypertrophy</b>	
Present	98
Absent	22

**Table 6:** Gender wise distribution of LA size in valvular heart disease and clot on Echo.

Sex	LA size	Valvular heart disease					Clot on Echo		
		MS	MS, AS, AR	MS, MR	MS, MR, AS, AR	S/P MVR	LA clot	LV clot	PR V Clot
Male	<4.1	-	-	-	-	-	-	01	-
	4.1-4.6	02	01	-	-	-	-	-	-
	4.7-5.1	05	05	-	04	-	02	-	-
	>5.1	01	02	03	-	-	02	-	-
Female	<3.9	-	-	-	-	-	-	-	-
	3.9-4.2	03	-	01	-	-	-	-	-
	4.3-4.6	02	-	02	-	-	-	-	-
	>4.6	11	-	07	-	05	10	01	01
Total	24	08	13	04	05	14	02	01	

**Discussion**

Atrial fibrillation is the commonest arrhythmia observed in the routine clinical practice. It increases with age and is becoming a significant cause of disability and death in the old age people [7]. The present study was designed to assess the clinical and echocardiographic profile of atrial fibrillation and its associated complications. A total of 120 cases of both genders (males 62 & females 58) between age group 21-70 years were recruited. Majority cases were in between 4<sup>th</sup> and 5<sup>th</sup> decades of age. In a study by Mohan G *et al.* mean age of cases was found to be 67.02 years and majority cases were belong to >50 years with male predominance (62% males and 38% females) [7]. In a study by Vidhya N *et al.* mean age was found to be 47 years with male predominance (55% males and 45% females) [8]. Majority cases had dyspnea (90) as a common symptom followed by palpitation (39), fatigue (18), chest pain [10] and syncope [5]. No symptoms were observed in 8 cases. In a study by Mohan G *et al.* noted that dyspnea was the commonest complication [7]. A study by Tejinder Kumar and SS Soodan noticed dyspnea was a common symptom in 74% cases followed by palpitation in 57% cases and syncope in 17% cases [9]. In a study by Tischler *et al.* dyspnea was reported in 62% cases, palpitations in 33% and syncope in 12% cases [10]. A study by Levey *et al.* noted palpitations in 54.1 cases, dyspnea in 44.4% and chest pain

in 10.1% cases [11]. Flaker *et al.* in their study observed that 78% cases had dyspnea and 11% had chest pain [14]. A study by KBR Sastry *et al.* found SOB (82%), pedal edema (40%), palpitations (20%), chest pain (8%), haemoptysis (4%) and stroke (6%) were main complaints in atrial fibrillation cases [18]. Among the study cases, the most common complication associated with atrial fibrillation was heart failure in 30% cases and thromboembolism in 21.6% cases. Among the cases with thromboembolism, 65.3% cases had CVA and 34.6%. In this study, rheumatic heart disease (45%) is the most common etiological factor associated with atrial fibrillation followed by hypertension (23.3%) and coronary artery disease (18.3%). In cases with CVA, 47.05% had CAD, followed by RHD in 35.2% and hypertension (11.7%). A study by Rajeev bhardwaj stated that the most common cause of AF was RHD, found in more than 60% cases (01). In a study by Mohan G *et al.* noted that hypertensive heart disease (68.8%) was the common etiological factor among non-vascular atrial fibrillation followed by CAD in 20% and dilated cardiomyopathy in 6.6% cases [7]. A study by Tejinder Kumar and SS Soodan noted RHD in 54% cases as an underlying cause of atrial fibrillation followed by CAD in 9% cases, hypertension in 8% cases and COPD in 8% cases [9]. In a study by Morin DP *et al.* noted that 70% of their study population had RHD as

etiological factor <sup>[12]</sup>. In a study by AFFIRM noted hypertension in 71% cases, CAD in 38% cases <sup>[13]</sup>. In a study by Davis *et al.* RHD, ischemic heart disease, hypertension and cor-pulmonale are the commonest condition noticed in the participants <sup>[15]</sup>. In a study conducted by Singh *et al.* reported RHD in 37.87%, cardiomyopathy in 13.6%, HTN in 3%, IHD in 3.03%, thyrotoxicosis in 9.05% and lone fibrillation in 1.5% of their patients <sup>[16]</sup>. Kumar *et al.* reported RHD in 39%, IHD in 29%, HTN in 54%, cardiomyopathy in 4%, COPD in 3% and thyrotoxicosis in 5% of their patients <sup>[17]</sup>. A study by Singh R *et al.* noticed RHD was the commonest cause of atrial fibrillation in 60% cases <sup>[19]</sup>.

The CHA2DS2-VASc score was above 2 in 64.1%, which indicates high risk for stroke occurrence. A study by Mohan G *et al.* noted CHA2DS2-VASc score <1 in 4% cases and >2 in 86% cases <sup>[7]</sup>. In echocardiography among RHD cases, 44.4% had mitral stenosis followed by MS with MR in 24.07% cases. In this study, 85.83% cases have no clots on echo, whereas 11.66% cases had LA clot, 1.66% cases had LV clot and 0.83% cases had prosthetic valve thrombosis on echo. In this study, among 54 RHD cases, 44.4% cases had mitral stenosis, followed by MS+MR in 24.07%, MS+AS+AR in 14.8% cases, MS+MR+AS+AR in 7.40% cases and S/P MVR in 9.25% cases (Table 3). In a study by KBR Sastry *et al.* noticed mitral stenosis in 88.57% cases and majority cases have combined valvular lesions MS+MR, MS+MR+AR, MS+AR, MS+MR+AS (18). Among the 17 cases with CVA, 5 cases had LA clot, 2 cases had LV clot and 1 case had PR v clot (Table 3). In males, 4 cases had LA clot and one cases had LV clot. In females, 10 cases had LA clot, 1 case had LV clot and 1 case had PR V clot (Table 6).

### Conclusion

The present study was provided with a basic clinical profile of atrial fibrillation. In this study, dyspnea, palpitation, fatigue, chest pain and syncope are the common presentations. Rheumatic heart disease, hypertension and coronary artery disease are the commonest etiological factor associated with atrial fibrillation. The left atrial enlargement was seen in study participants and a structural abnormality in echocardiography was observed. The study provided baseline information about the risk factors for the occurrence of atrial fibrillation.

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