



## AN INTERESTING INTERPLAY OF ATRIAL FIBRILLATION-CLINICAL, RADIOLOGICAL AND PROGNOSTICATION PROFILE OF CEREBROVASCULAR ACCIDENT IN A TERTIARY CARE HOSPITAL

### Neurology

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### ABSTRACT

Cryptic strokes<sup>7</sup> in the past are now *sine qua non* of atrial fibrillation. This observational clinical study conducted on 200 stroke patients based on exclusion and inclusion criteria studies interplay of stroke and atrial fibrillation with respect to aetiology, types, clinico-radiological correlation and prognosis. Out of 200 patients studied, permanent type of AF and hypertensive heart disease were most common type of atrial fibrillation and it's cause respectively. Of types of stroke in patients with AF, 63.5% were thrombotic, 35% were haemorrhagic including 1.5% of subarachnoid bleed. Morbidity scores, early recurrent strokes and case fatality were higher in patients with AF. Patients of atrial fibrillation have all varieties of stroke including thrombotic, haemorrhagic and subarachnoid bleed. They are likely to have compromised quality of life, morbidity-mortality aspects and higher early recurrence of stroke. It's imperative not to miss treatable arrhythmia to bring down morbidity and mortality in stroke patients.

### KEYWORDS

Atrial fibrillation, Cerebrovascular accident, Thrombotic stroke, Haemorrhagic stroke.

### INTRODUCTION

**BLAST FROM THE PAST**—Though stroke and atrial fibrillation both are ancient diseases known to mankind, the interplay between the two are always dynamic and interesting! The occurrence of atrial fibrillation in adults has been reported to be increasing. Atrial fibrillation (AF) quintuples the risk of stroke; occurrence of atrial fibrillation in adults has been reported to be increasing<sup>1</sup>, becomes increasingly prevalent among persons aged >70 years<sup>2</sup>. Atrial fibrillation is a risk "marker" for stroke and that the increased stroke incidence in persons with this arrhythmia is a result of age and associated cardiovascular abnormalities<sup>3,4</sup>. Subclinical AF is shown to be associated with ischaemic stroke as well as silent ischaemic brain lesions<sup>19</sup>. Atrial fibrillation can be paroxysmal, persistent, permanent. Each type of atrial fibrillation carries risk of stroke<sup>22</sup>. Mechanism of stroke in atrial fibrillation is due to atrial cardiopathy<sup>23</sup>, aortic arch plaque, widened pulse pressure, and elevated systolic blood pressure is associated with reduced appendage flow velocity<sup>5</sup>. People with atrial fibrillation have an increased risk of stroke compared with people with sinus rhythm<sup>6</sup>. Primary prevention of stroke has been studied in several randomized trials in patients with atrial fibrillation, the results suggesting that a 3-6% annual risk of stroke can be reduced by at least 20-40% with anticoagulant or antiplatelet treatment<sup>7-9</sup>. Atrial fibrillation is associated with an increased risk of death in the first four weeks after a stroke<sup>10,11</sup>. Recurrent stroke is high in atrial fibrillation compared with sinus rhythm<sup>12-14</sup>.

Philip A et al<sup>16</sup> showed, age-adjusted incidence of stroke was more than fivefold excess when atrial fibrillation was present (p<0.001).

Though it is one of the commonly encountered cardiac arrhythmia in clinical practice, there are very few studies reported on this from India.

**METHODS**- Observational clinical study of 200 stroke inpatients being treated at department of neurology in a tertiary care hospital with exclusion criteria being Anticoagulation related bleeding and acute myocardial infarction at presentation.

#### Objectives of the study

- To determine in patients with stroke whether atrial fibrillation influences clinical features, and prognosis.
- To evaluate the cause of atrial fibrillation
- To determine the contribution of atrial fibrillation to the causation of different types of stroke.
- To document the clinical outcomes and quality of life of patients of atrial fibrillation with stroke and attempt to determine whether atrial fibrillation influences the outcome (30 days).

#### METHODS OF COLLECTION

Information on patient profile, biochemical profile (RFT, coagulation profile), ECG, 2D ECHO, neuroradiological (CT/MRI) data were collected. Co morbidities were analysed in patients of stroke with respect to presence or absence of atrial fibrillation. Strokes were

categorised into thrombotic and haemorrhagic strokes including subarachnoid bleed, further characterised into large vessel infarct, subcortical infarct, embolic infarct, supratentorial bleed, infratentorial bleed, subarachnoid bleed and lacunar infarcts. These are analysed further in patients with and without atrial fibrillation. Causes of atrial fibrillation were assessed and characterised into paroxysmal, persistent and permanent variety.

Katz index, NIHSS score, MRS score were used at admission and at 30 days follow up in patients with and without atrial fibrillation to assess functional status of stroke patients. HAS-Recurrence of stroke at 30 days and Case fatality were analysed.

#### Statistical analysis:

Descriptive and inferential statistical analysis has been carried out in the present study. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Leven's test for homogeneity of variance has been performed to assess the homogeneity of variance. Chi-square/ Fisher Exact test has been used to find the significance of study parameters. Significant figures + Suggestive significance (P value: 0.05 < P < 0.10)

\* Moderately significant (P value: 0.01 < P < 0.05)

\*\* Strongly significant (P value: P < 0.01)

#### Statistical software:

The Statistical software namely SPSS 18.0, and R environment ver.3.2.2.

### RESULTS

Out of 200 patients studied with cerebrovascular accident, 65% were men and 35% were women. 12% of population in the cohort were stroke in young (Table 1).

**Table 1: Comparison of Clinical variables according to ECG (With and Without AF) of patients studied.**

Variables	ECG		Total (n=200)	P value
	With Atrial Fibrillation (n=53)	Without Atrial Fibrillation (n=147)		
Age in years				
• 21-30	6(11.3%)	0(0%)	6(3%)	<0.001**
• 31-40	8(15.1%)	10(6.8%)	18(9%)	
• 41-50	0(0%)	22(15%)	22(11%)	
• 51-60	6(11.3%)	23(15.6%)	29(14.5%)	
• 61-70	29(54.7%)	47(32%)	76(38%)	
• 71-80	0(0%)	28(19%)	28(14%)	
• 81-90	4(7.5%)	17(11.6%)	21(10.5%)	

Gender				
Female	14(26.4%)	56(38.1%)	70(35%)	0.126
• Male	39(73.6%)	91(61.9%)	130(65%)	
Socio Economic Status				
• Lower	18(34%)	78(53.1%)	96(48%)	0.005**
• Lower middle	2(3.8%)	12(8.2%)	14(7%)	
• Upper lower	32(60.4%)	48(32.7%)	80(40%)	
• Upper middle	1(1.9%)	9(6.1%)	10(5%)	

Chi-Square/Fisher Exact Test

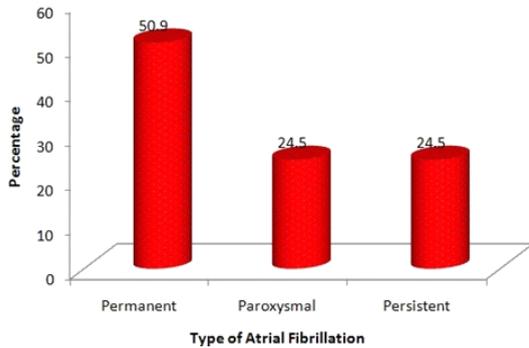
27.9% of stroke patients without atrial fibrillation and 69.8% of stroke patients with atrial fibrillation were hypertensives(Table 2). 19% of the stroke cohort without atrial fibrillation and 41.5% of stroke patients with atrial fibrillation were Diabetics(both are statistically significant with p value of 0.001\*\*) (Table 2).

**Table 2: Comparison of Incidence of hypertension and DM according to ECG (With and Without AF) of patients studied.**

	ECG		Total (n=200)	P value
	With Atrial Fibrillation (n=53)	Without Atrial Fibrillation (n=147)		
Hypertension	37(69.8%)	41(27.9%)	78(39%)	<0.001**
Diabetics	22(41.5%)	28(19%)	50(25%)	0.001**

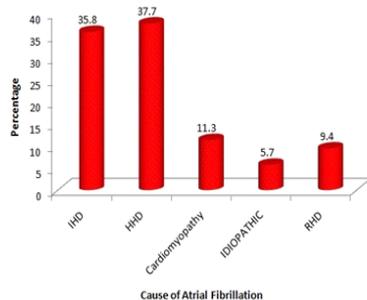
Chi-Square/Fisher Exact Test Of the different types of Atrial fibrillation, Permanent was most common at 50.9%,followed by paroxysmal at 24.5% and persistent type at 24.5%(Fig 1).

**Figure 1: Types of atrial fibrillation**



Patients with stroke in young had predominantly paroxysmal variety of atrial fibrillation (60%) with structurally normal heart. Hypertensive heart disease was the most common cause of atrial fibrillation at 37.7%,Coronary artery disease 35.8%, cardiomyopathy 11.3%, valvular heart disease at 9.4%, and 5.7% were idiopathic(Fig 2).

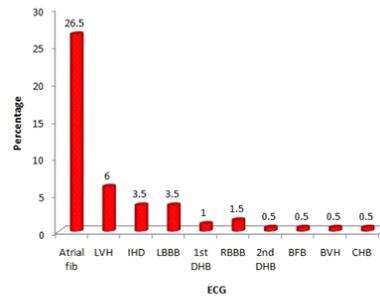
**Figure 2: Causes of atrial fibrillation.**



IHD-ischemic heart disease; HHD-hypertensive heart disease; RHD-rheumatic heart disease

On electrocardiographic analysis,among abnormal cardiac rhythms, AF was most common at 26.5%(Fig 3)

**Figure 3:Electrocardiographic findings**



LVH-left ventricular hypertrophy; IHD-Ischemic heart disease; LBBB-Left bundle branch block; DHB-degree heart block; RBBB-Right bundle branch block; BFB-bifascicular block; BVH-Biventricular hypertrophy; CHB-complete heart block.

Of different types of stroke in patients with atrial fibrillation, 63.5% were thrombotic,35% were haemorrhagic including 1.5% of subarachnoid bleed.(Table 3).

**Table 3: Type of Stroke distribution in relation to ECG (With and Without AF) of patients studied**

Type of Stroke	ECG		Total
	With Atrial Fibrillation	Without Atrial Fibrillation	
Thrombotic	40(75.5%)	87(59.2%)	127(63.5%)
Haemorrhagic	11(20.8%)	59(40.1%)	70(35%)
Subarachnoid bleed	2(3.8%)	1(0.7%)	3(1.5%)
Total	53(100%)	147(100%)	200(100%)

P=0.010\*\*, Significant, Fisher Exact Test

On analysis of neuroradiological data, 8.5% of strokes were large vessel, 24.5% were embolic, 13% were lacunar, and 17.5% were subcortical. 23% had supratentorial bleed and 12% infratentorial, 1.5% had subarachnoid bleed. (Table 4).

**Table 4:CT/ MRI Findings in relation to ECG (With and Without AF) of patients studied**

CT MRI Findings	ECG		Total
	With Atrial Fibrillation	Without Atrial Fibrillation	
Supratentorial bleed	11(20.8%)	35(23.8%)	46(23%)
Embolic infarct	33(62.3%)	16(10.9%)	49(24.5%)
Subcortical infarct	2(3.8%)	33(22.4%)	35(17.5%)
Lacunar infarct	2(3.8%)	24(16.3%)	26(13%)
Infratentorial bleed	0(0%)	24(16.3%)	24(12%)
Large vessel infarct	3(5.7%)	14(9.5%)	17(8.5%)
Subarachnoid bleed	2(3.8%)	1(0.7%)	3(1.5%)
Total	53(100%)	147(100%)	200(100%)

P<0.001\*\*, Significant, Chi-Square Test

Analyzing 30 day case fatality rate, it was significantly higher with atrial fibrillation (22.6%) than without (9.5%); the risk of early recurrent stroke (within 30 days) was 20.8% with atrial fibrillation and 6.8% with sinus rhythm. Modified Ranklin score and katz index were poor with patients having atrial fibrillation and stroke at admission and 30 day follow up compared to without. (Table 5).

**Table 5: Comparison of MRS, KATZ score,early recurrent stroke and fatality.**

MRS	ECG		Total	P value
	With Atrial Fibrillation	Without Atrial Fibrillation		
Admission	3.23±0.87	3.16±0.59	3.18±0.67	0.558
Follow up	3.64±1.81	2.29±1.50	2.65±1.69	<0.001**
KATZ score	With Atrial Fibrillation	Without Atrial Fibrillation	Total	P value
Admission	2.49±0.72	2.64±0.96	2.60±0.91	0.307
Follow up	1.98±1.59	3.38±1.52	3.01±1.65	<0.001**
Fatality Score	With Atrial Fibrillation	Without Atrial Fibrillation	Total	P value

No	41(77.4%)	133(90.5%)	174(87%)	
Yes	12(22.6%)	14(9.5%)	26(13%)	P=0.015*
Total	53(100%)	147(100%)	200(100%)	
<b>Early recurrent stroke</b>	<b>With Atrial Fibrillation</b>	<b>Without Atrial Fibrillation</b>	<b>Total</b>	<b>P value</b>
No	42(79.2%)	137(93.2%)	179(89.5%)	
Yes	11(20.8%)	10(6.8%)	21(10.5%)	P=0.005**
Total	53(100.0%)	147(100.0%)	200(100.0%)	

## DISCUSSION

Stroke patients with atrial fibrillation behave in a different way than stroke patients without. This study reveals that atrial fibrillation has age dependant rise with peak in 6<sup>th</sup> to 7<sup>th</sup> decade of life. This is in accordance with the literature quoted earlier. Diabetes and hypertension in addition being independent risk factors for stroke, they are associated with atrial fibrillation as shown by previous studies by Ostgren CJ et al<sup>24</sup>. Analysis of most fundamental investigation like ECG was abnormal in statistically significant 44% patients, most common abnormality being atrial fibrillation in 26.5% of the patients in our study. Swedish data suggest that screening by intermittent ECG is cost-beneficial<sup>21</sup>. Christine Benn Christiansen Christine Benn Christiansen et al showed, cardioembolism is the source of stroke in 16–30% of cases of ischaemic strokes<sup>17,18</sup>. Valvular heart diseases have taken a back seat and the prime aetiology of atrial fibrillation being ischemic and hypertensive heart disease in the present study. In contrary to the common belief that atrial fibrillation equates embolic phenomenon, present study shows both thrombotic and haemorrhagic strokes occur in patients with atrial fibrillation including subarachnoid bleed. This was described in Atrial substrate model which states that, AF patients often have nonembolic strokes because AF serves as a marker of upstream systemic vascular risk factors<sup>26</sup>. Lodder J et al<sup>23</sup> showed that Lacunar strokes are associated with atrial fibrillation as confirmed in the present study. Patients of strokes with atrial fibrillation are more likely to have thrombotic than haemorrhagic stroke which is statistically significant. Present study reveals that 62.3% strokes in atrial fibrillation are embolic phenomenon in contrast to 10.9% in patients without atrial fibrillation. Dulli DA et in his study ( $n = 1061$ ) found that cardioembolism was the source of ischaemic stroke in 61% of strokes in patients with AF vs. 20% in patients without AF<sup>20</sup>. NIHSS score, MRS, KATZ scores, Case fatality, early recurrent stroke showed statistically significant difference both at admission and at 30 days follow up among stroke patients with atrial fibrillation compared to without. Peter Sandercock et al<sup>15</sup> showed that for patients with cerebral infarction, the 30 day case fatality rate was significantly higher with atrial fibrillation (23%) than with sinus rhythm (8%); the risk of early recurrent stroke (within 30 days) was 1% with atrial fibrillation and 4% with sinus rhythm. In patients who survived at least 30 days the average annual risk of recurrent stroke was 8.2% with sinus rhythm and 11% with atrial fibrillation.

## CONCLUSION

Despite the availability of good epidemiological data on individual studies of oldest arrhythmia, the atrial fibrillation and the oldest recognized illness, the stroke with more than 2400 years history, the study which addressed the interplay of the two is still lacking! This Indian study now combines both and that's the 'novelty' of the project!! This study highlights the fact that Atrial fibrillation accounts to age related rise in stroke risk of both thrombotic and haemorrhagic variety with compromised quality of life, increased mortality and increased risk of recurrent stroke at 30 days. It's important to address the issue of looking for most common and treatable arrhythmia to bring down morbidity and mortality in stroke patients.

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