Section: Medicine

Original Research Article

PROFILE OF PATIENTS WITH ATRIAL FIBRILLATION AND ITS CORRELATION WITH LEFT ATRIAL SIZE AND BODY MASS INDEX

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Received : 12/03/2024
Received in revised form : 05/05/2024
Accepted : 22/05/2024

Keywords:
Atrial fibrillation, Gender, Left atrium diameter, Body Mass Index.

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DOI: 10.47009/jamp.2024.6.3.79

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (3); 386-390

Abstract

Background: Atrial fibrillation is a common cardiac arrhythmia affecting 33.5 million people globally. Left atrium enlargement is related to higher risk of developing Atrial fibrillation and adverse cardiovascular events. The study was conducted to assess the profiles of patients with Atrial fibrillation and to determine the correlation of Left atrium size and Body Mass Index in patients with Atrial fibrillation. **Materials and Methods:** A hospital based cross sectional study was conducted among 139 patients with Atrial fibrillation admitted to the Intensive Coronary Care Unit (ICCU) and Medicine wards of a tertiary centre in Imphal, Manipur. The study was carried out for a period of 2 (two) years from September 2019 to August 2021. The diagnosis of Atrial fibrillation was made by Electrocardiogram and 2D Echocardiography study. **Result:** Out of 139 patients studied,72(51.8%), 50(36%) and 17(12.2%) subjects had paroxysmal, persistent and permanent Atrial fibrillation respectively. Shortness of breath was the most common symptom. The study subjects with enlarged Left atrium diameter had higher age, weight, height, BMI, systolic and diastolic blood pressure and pulse rate as compared to subjects with normal Left atrium diameter. More number of female patients have normal Left atrium diameter as compared to male patients. Left atrium clot and Left atrium appendages clot were observed in 6.5% patients. Subjects with Left atrium enlargement had higher Body Mass Index compared to subjects with normal Left atrium diameter. **Conclusion:** The study concluded that patients with enlarged Left atrium had higher mean age, Body Mass Index, blood pressure compared to those with normal Left atrium diameter. There exist an association between obesity and Atrial fibrillation, which is independent or mediated by the Left atrium size.

INTRODUCTION

Atrial fibrillation is a cardiac arrhythmia, which causes major cardiovascular morbidity and mortality.[1] It is independently associated with a 3-to-5-fold risk for stroke and a 1.5 to 2 fold risk of all – cause mortality.[2] The risk factors includes advanced age, hypertension, diabetes mellitus, valvular heart diseases and Left atrial enlargement.[3] Atrial fibrillation in females carry a higher risk of stroke and thromboembolism compared to males independent of anticoagulant use. Thus, female sex is included as a risk factor within the CHA2DS2-VASc score. Beyond the impact on Atrial fibrillation episodes, recurrences after ablation therapies, the clinical relevance of Left atrium diameter, as assessed by trans-thoracic echocardiography is attributed to intra cavitary thrombus formation given that Left atrium enlargement is a surrogate marker of stroke risk.[4]
Left atrium enlargement has been proposed as a barometer of diastolic burden and a predictor of

common cardiovascular outcomes such as atrial fibrillation, congestive heart failure, stroke and cardiovascular death. Left atrium enlargement reflects remodeling associated with pathophysiologic processes.[4] There is strong evidence that Left atrium enlargement, as determined by echocardiography is a robust predictor of cardiovascular outcomes.[5] Despite an established association between obesity and Atrial fibrillation, the question remains whether this association is independent or mediated by Left atrium size.[6,7]

There exist limited data regarding the profiles of patients with Atrial fibrillation and its correlation with Left atrium size and Body Mass Index (BMI) in this North – East part of the country. So, this study was done with the objective to assess the profiles of patients with Atrial fibrillation and to determine the correlation of Left atrium size and Body Mass Index with Atrial fibrillation.

MATERIALS AND METHODS

Study design: A hospital based cross-sectional study done in the Intensive coronary care unit ICCU and Cardiology Out Patient Department of Regional Institute of Medical Sciences, Imphal over a period of 2 (two) years from September 2019 to August 2021. Ethical approval for the study was obtained from the Institute's Research Ethics Board. The objective of the study was to assess the profiles of patients with Atrial fibrillation and to determine the correlation of Left atrium size and Body Mass Index with Atrial fibrillation.

Inclusion Criteria

Age more than 18 years of both gender diagnosed with Atrial fibrillation. Those who gave consent for participation in the study.

Exclusion Criteria

Patients under 18 years of age and those with pathology of left atrium such as left atrial myxoma and those not willing to participate in the study.

Procedure: The study subjects were 139 patients of both sexes who had atrial fibrillation. They were assessed by detailed history taking, clinical examination, serological and diagnostic test included Electrocardiogram, Echocardiography, Chest X-Ray etc. Electrocardiogram was done using Clarity Med, model: ECG 100D-3Ch, manufactured in India. Echocardiography was done using SONOACE X8 Version 2.03.00. M345-E20300-00 manufactured in Korea. Other miscellaneous test was done as and when required. Total confidentiality was maintained by coding of patient's data throughout the study. All data collected were documented and analysed statistically to draw a useful conclusion.

Statistical analyses: The collected data was analysed using SPSS (Statistical Package for Social Sciences software) 22.0 and R environment ver.3.2.2 were used for analysis of the data. Microsoft word and Excel were used to generate graphs, tables etc. Descriptive statistics like frequency, percentage, mean, standard deviation and proportions were used. A probability value < 0.05 was considered as statistically significant. Through out the study privacy and confidentiality was maintained.

RESULTS

The study included 139 patients diagnosed with atrial fibrillation. The age distribution had majority in the age group 60-70 years. The mean age of the study population was 67.17 ±7.90 years. The gender distribution had 53.2% (74) female and male constituted 46.8% (65) of the study population. Based on the types of atrial fibrillation 72(51.8%), 50(36%) and 17(12.2%) patients had paroxysmal, persistent and permanent atrial fibrillation respectively. Atrial fibrillation of valvular origin was observed in 23% patients, while 77% patients had non valvular origin. Shortness of breath in 41% patients was the most common symptom. Hypertension was a major comorbidity noted in 59.7% subjects, followed by diabetes in 30.9% as listed in [Table 1].

As shown in [Table 2], majority of the study population with normal left atrium diameter were younger in age in comparison to those with enlarged left atrium diameter, with statistically significant p-value of 0.001. In this study more male patients have enlarged left atrium diameter compared to female patients. In the study, no patients with normal left atrial diameter had left atrium clot or left atrial appendages clot. On electrocardiogram study 43.4% patients had Left atrial enlargement.

As listed in [Table 3], those subjects with enlarged left atrial diameter had higher age, weight, body mass index, blood pressure and pulse rate compared those with normal left atrial diameter. Comparatively those subjects with normal Left Atrial diameter had more pulse deficit and height.

As listed in [Table 4], Only one patient required cardioversion. 26.4% patients were on Warfarin, 4.7% patients were on newer oral anticoagulants, 5.7% patients were on antiplatelets and 16% patients were on antiarrythmics in the study group.

As shown in [Table 5], subjects with of Left atrial enlargement had higher Body Mass Index compared to subjects with normal Left atrial diameter.

Table 1: Basic characteristics of the study population with Atrial Fibrillation (N=139)

Characteristics	Percentage % (n)
Age in years	
Less than 60	12.2% (17)
51 - 60	61.9% (86)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

More than 60	25.9% (36)
Gender	
Male	46.8% (65)
Female	53.2% (74)
Type of Atrial fibrillation	
Paroxysmal	51.8% (72)
Persistent	36% (50)
Permanent	12.2% (17)
Clinical variables	
Chest Pain	12.9%(18)
Shortness of breath	41% (57)
Palpitation	24.5% (34)
Syncope	3.6% (5)
Stroke	23.7% (33)
Thromboembolic episodes	4.3% (6)
Hypertension	59.7% (83)
Diabetes	30.9% (43)
Thyroid disorder	19.4% (27)
Smoking	29.5% (41)
Alcoholism	15.1% (21)

Table 2: Baseline characteristics in relation to Left Atrial size (N=139)

Characteristics	**Category of LA enlargement**		**P Value***
	Normal LA diameter	**LA enlarged**	
Age group (in years)			
<60	17(51.5%)	0(0%)	0.001
60-70	11(33.3%)	75(70.8%)	
>70	5(15.2%)	31(29.2%)	
Gender			
Male	10(30.3%)	55(51.9%)	0.030
Female	23(69.7%)	51(48.1%)	
Left Atrial Clot			
Yes	0	9(8.8%)	0.115
No	33(100.0%)	97(91.5%)	
Left Atrial appendage clot			
Present	0	9(8.8%)	0.115
Absent	33(100.0%)	97(91.5%)	
Features of LA enlargement (on ECG)			
Yes	0(0%)	46(43.4%)	0.001
No	33(100%)	60(56.6%)	
Left atrial enlargement (on CXR)			
Yes	0(0%)	63(59.4%)	0.001
No	33(100%)	43(40.6%)	

Table 3: Clinical variables in relation to Left Atrial size (N=139)

Variables	**Category of LA enlargement**		**P Value***
	Normal Left Atrial Diameter	**LA enlarged**	
Age (in years)	61.45 ± 6.61	68.94 ± 7.44	0.001
Height (cm)	161.12 ± 3.94	158.9 ± 3.95	0.0058
Weight (kg)	59.85 ± 3.6	63.31 ± 5.86	0.002
Body Mass Index(kg/m2)	23.14 ± 1.99	25.33 ± 2.89	0.001
Systolic BP (mmHg)	123.48 ± 12.25	133.64 ± 11.65	0.001
Diastolic BP (mmHg)	79.85 ± 7.59	85.87 ± 5.02	0.001
Pulse rate (per min)	90.12 ± 10.17	96.58 ± 10.09	0.002
Pulse deficit	4.24 ± 5.67	3.09 ± 8.94	0.488

Table 4: Showing treatment variables according to LA enlargement category (N=139)

Variables	**Category of Left Atrial enlargement**		**P Value***
	Normal Left Atrial Diameter	**LA enlarged**	
History of Cardioversion			
No	33(100%)	105(99.1%)	0.575
Yes	0(0%)	1(0.9%)	
On Warfarin			
No	33(100%)	78(73.6%)	1.000
Yes	0(0%)	28(26.4%)	
On Newer oral Anticoagulants			
No	33(100%)	101(95.3%)	1.000
Yes	0(0%)	5(4.7%)	
On Antiplatelets			
No	33(100%)	100(94.3%)	0.162
Yes	0(0%)	6(5.7%)	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

On Antiarrythmics			
No	33(100%)	89(84%)	0.014
Yes	0(0%)	17(16%)	

Table 5: Category of BMI –frequency distribution in relation to LA enlargement of patients studied (N=139)

Category of BMI	Category of LA enlargement	
	Normal LA Diameter n (%)	LA enlarged n (%)
Normal	22(66.7%)	21(19.8%)
Overweight	5(15.2%)	41(38.7%)
Obese	6(18.2%)	44(41.5%)

DISCUSSION

In this study, advancing age is the most prominent risk factor for atrial fibrillation. The prevalence of atrial fibrillation varies among different ethnic population, epidemiological studies have consistently found a step-wise increase in the prevalence of atrial fibrillation with advancing age.[8] The mean age of the study population was found to be 67.17 ± 7.90 years. Tsang TS et al,[9] in their study reported a mean age of 71±15 years. The majority of the patients were in 60-70 years age group. In a study done by Lippi G et al,[10] the highest number of atrial fibrillation was reported in the age group of 65-69 years.

In our study, the gender distribution had 46.8% male and 53.2% female. In a similar study by Huang G et al,[11] reported 48.1% as male and 51.9% as female which is comparable with the present study. Proeitti M et al,[12] in their study reported male predominance with 40.1 % were female and 59.9% were male. However, the mortality rate and stroke risk were more common in women with atrial fibrillation.[13]

In our study, paroxysmal atrial fibrillation accounted for 51.8%, persistent in 36% and permanent atrial fibrillation in 12.2%. Dhungel S et al,[14] reported paroxysmal atrial fibrillation in 55%, persistent atrial fibrillation in 34.4% and permanent atrial fibrillation in 10.4% in their study. In the present study 77% had non-valvular atrial fibrillation which was more than those with valvular atrial fibrillation at 23%.[14]

The most common symptom was shortness of breath in 41% study subjects followed by palpitation in 24.5%, stroke in 23.7% and chest pain in 12.9%. Similar findings were reported study by Dhungel et al14 with shortness of breath in 41%, palpitations in 27.8% and stroke in 24.6%. Chest pain in atrial fibrillation relates to impaired myocardial perfusion, elevated coronary vascular resistance, an alteration in the sympathetic nervous system activation and the renin-angiotensin system.[15]

In this study, 29.5% had history of smoking and 15.1% had history of alcoholism. This is in contrast to the findings of Gedamu Y et al,[16] with a reported 3.7% as smokers and 54.5% with alcoholism. This discrepancy in the data might be due to higher prevalence of smoking and alcoholism in different ethnic population.

Smoking may indirectly increase atrial fibrillation susceptibility by predisposing to atrial ischemia, myocardial infarction and heart failure. It also accelerates atherosclerosis through effects on lipids, endothelial function, oxidative stress, inflammation, and thrombosis. Reduced lung function and Chronic Obstructive Pulmonary Disease also increase vulnerability to atrial fibrillation.[8]

Out of total 139 patients, 59.7% patients had hypertension, 30.9% had diabetes and 19.4% had thyroid disorders. A study by Thacker LE et al,[17] reported hypertension in 54% which is comparable with the present study.

In our study of 139 patients, 26.4% patients were on Warfarin, 4.7% patients were on newer oral anticoagulants, 5.7% patients were on antiplatelets and 16% patients were on antiarrythmics. A previous study done by Buccelletti F et al,[18] reported 15.4% patients on warfarin, 31.2% on antiplatelets and 20.9% on antiarrythmics.

Out of 139 patients, 76.2% (106) had Left atrium enlargement.[12] In this study, patients with Left atrium enlargement had higher BMI as compared to those with normal Left atrium diameter, with a statistically significant p-value of <0.05.12 The features of left atrium enlargement on electrocardiogram (ECG) was observed in 43.4%, while absent P waves in 12.3% subjects and features of left atrium enlargement on Chest X-ray in 59.4% subjects. In the present study, patients with enlarged left atrium had higher mean age (68.94±7.44 years), height (158.9±3.95 cms), weight (63.31±5.86 kg), BMI (25.33±2.89 kg/m2), systolic blood pressure (133.64±11.65 mmHg), diastolic blood pressure (85.87±5.02mmHg) and pulse rate (96.58±10.09) compared to those with normal left atrium diameter which was statistically significant with p<0.05.12. A significant association was noted between enlarged left atrium and patients on antiarrythmics with a p<0.014.

Left atrium clot and left atrium appendages clot were observed in 6.5% subjects, similar to the findings of the study done by Tang RB et al.[19]Atrial contractile dysfunction from reduced myofibrillar sensitivity to calcium ion and intracellular calcium ion transients. Clinically, reduced Left atrium emptying velocity on transesophageal echocardiography is associated with presence of spontaneous echo contrast, increased Left atrium thrombus and stroke.[8]

Those subjects with normal Left atrium diameter were younger compared to those with enlarged Left

ISSN (O): 2687-5365; ISSN (P): 2753-6556

atrium diameter, which was statistically significant with p value of <0.001. Similarly female subjects have normal Left atrium diameter as compared to male subjects. A study done by Niktin NP et al,[20] reported that older subjects had significantly higher Left atrium diameter but Left atrium diameter was found to be smaller in women compared to men. This is in contrast to the findings of Proietti M et al,[12] with Left atrium enlargement found more frequently in females than male (p<0.032).

Out of 139 patients, 30.9% had normal body mass index (BMI), 33.1% were overweight, 36% were obese. Similar findings were reported by Huang G et al,[11] where 30.1% had normal BMI, 36.3% were overweight and 33.5% were obese. Increasing weight correlated with increased left atrial volume and pressure, ventricular mass and pericardial fat. Histologic analysis revealed that myocardial lipidosis, fibrosis, and inflammatory infiltrates increased progressively with increasing weight. These pathologic changes are associated with decreased conduction velocity and increased atrial fibrillation.[8]

CONCLUSION

Our study concluded that patients with enlarged Left atrium had higher mean age, Body Mass Index, blood pressure, pulse rate compared to those with normal Left atrium diameter. Increasing weight correlated with increased left atrial volume and pressure and higher incidence of Atrial fibrillation. There exist an association between obesity and Atrial fibrillation, which is independent or mediated by the Left atrium size.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556