

A STUDY OF RISK FACTOR PROFILE OF ATRIAL FIBRILLATION APPLYING CHA2DS2-VASC SCORE

Ahmed Mustafa, Imtiaz Ali Khan, Hafiza Sonia Iqbal, Anam Fatima Janjua, Faraz Ahmad, Saadat Ullah Khan, Sohail Aziz, Abdul Hameed Siddiqui, Farhan Tuyyab

Armed Forces Institute of Cardiology/National Institute of Heart Disease (AFIC/NIHD)/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: To identify the risk factor profile of Atrial Fibrillation applying CHA2DS2-VASC scoring system

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: The study was conducted in outdoor patient and emergency departments of Armed Forces Institute of Cardiology/National Institute of Heart Diseases in 4 months duration after approval of synopsis, from Sep 2019 to Dec 2019.

Methodology: All patients with symptoms of palpitation and dyspnea were evaluated with detailed history, physical examination, electrocardiogram and 2-D echocardiography for collection of data. Patients who were found with Atrial Fibrillation on electrocardiogram and non-valvular on 2-D echocardiography were enrolled. Detailed History regarding CHA2DS2-VASC scoring system was taken. Patients with age <18 years, those with moderate rheumatic stenosis, hypertrophic cardiomyopathy and Atrial Fibrillation with prosthetic valves were excluded. Data was entered and analyzed with SPSS-23.

Results: Out of 100 patients enrolled, frequencies of male and female patients were 60 (60%) and 40 (40%) respectively. The age varied from 25 years to 89 years with a mean age of 64.27 ± 12 years. Maximum number of patients was between 65-74 years (31%). Hypertension (57%) was the most common risk factor after gender followed by age. Frequencies of other risk factors were congestive heart failure (33%), diabetes mellitus (18%), vascular disease (14%) and stroke/TIA/thrombo-embolism (13%). Paroxysmal atrial fibrillation was the most common type of atrial fibrillation observed (67%) followed by persistent atrial fibrillation (31%). The number of patients having CHA2DS2-VASC score 2 and greater than 2 were 76 (76%) and less than 2 were 24%.

Conclusion: Our findings highlighted the prevalence of non-modifiable as well as modifiable predictors of thromboembolic phenomena in atrial fibrillation using CHA2DS2-VASC scoring system in our population.

Keywords: Atrial Fibrillation, CHA2DS2-VASC, Risk factor profile.

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INTRODUCTION

Atrial fibrillation is the most common sustained cardiac arrhythmia which is characterized by the degeneration of the organized electrical activity into a rapid chaotic pattern¹. It accounts for approximately one third of hospitalization of cardiac rhythm disturbances². The prevalence of atrial fibrillation is higher in men and increases with age³. Atrial fibrillation is associated with increased risk of stroke, heart failure and mortality⁴.

Atrial fibrillation can be classified as new-onset and recurrent (at least two episodes).

Depending upon patterns, they can be paroxysmal (self-limiting), persistent (sustained >7 days), long-standing persistent (sustained >12 months) and permanent (no longer pursuing restoration of sinus rhythm). It is also important to differentiate between valvular (rheumatic mitral stenosis, prosthetic heart valve or mitral valve repair) and non-valvular atrial fibrillation. Lone fibrillations are atrial fibrillations without any absolute cause⁵.

Among the risk factors, atrial fibrillation is associated with advanced age, hypertension, valvular heart diseases, congestive heart diseases and coronary heart diseases⁶. Atrial fibrillation is also linked with cardiac surgeries hyperthyroidism, obstructive sleep apnea and obesity.

Correspondence: Dr Ahmed Mustafa, Cardiology Department, AFIC/NIHD, Rawalpindi Pakistan

Among other factors that contribute to atrial fibrillation are physiological stress, drugs and pulmonary embolism.

Patients with atrial fibrillation have a strong pre-dilection to wards increased risk of stroke⁷. CHA2DS-V2ASC is the risk stratification scoring system which is used to know about the risk of stroke in atrial fibrillation patients⁸. Factors which contribute towards CHA2DS2-VASC scoring system are diabetes mellitus, hypertension, congestive heart failure, age (greater than or equal to 75 years), stroke / TIA / thromboembolism, age (65-74 year) and female sex¹¹. These factors mainly contribute towards stroke in atrial fibrillation patients⁹.

The purpose of this study is to know the risk factor profile of atrial fibrillation patients through CHA2DSV2AC so that early recognition of the patients having pre-dilection to stroke could be done. Similarly, pre-dominance of risk factor profile (predictors of warfarin use) in atrial fibrillation patients could be found out and dealt with as early as possible so that the risk of stroke may be decreased in these patients.

METHODOLOGY

The study was conducted at Armed Forces Institute of Cardiology/National Institute of Heart Diseases, Rawalpindi. A total of 100 patients with a history of atrial fibrillation (treated or not and whatever the rhythm at the time of inclusion) with at least 1 atrial fibrillation episode documented by standard ECG or by Holter ECG in the previous 12 months or documented current atrial fibrillation were enrolled. Informed written consent was taken. Data regarding age, gender, clinical presentations especially palpitations and dyspnea was collected. Other features like diabetes mellitus, hypertension, congestive heart failure, history of stroke and vascular diseases were also noted in the history. Detailed physical examination was done. Laboratory tests including CBC, metabolic status, magnesium levels and thyroid function tests were performed. ECG obtained was evaluated from electrophysiology department for confirmation of diagnosis (Abs-

ence of *p*-waves and replaced by fibrillatory f waves, ventricular rate is irregularly irregular). 2-D echocardiography was done to know about ejection fraction, mitral valve disease, left atrial size and pulmonary hypertension. Exclusion criteria included patients who were unable to perform written informed consent, mental disability such as dementia or significant mental disability. Similarly, Patients with age less than 18 years, those with moderate rheumatic stenosis, hypertrophic cardiomyopathy and Atrial fibrillation with prosthetic valves were ruled out. Congestive heart failure was defined as patients with ejection fraction <40%. Hypertension was defined as blood pressure >140/90 or even less than 140/90 with medication. Among age groups, people with age groups between 18-90 years were included. Diabetes mellitus was defined as patients with deranged blood sugar status i.e. fasting blood sugar level greater than 110mg/dl and random blood sugar level greater than 180mg/dl and HbA1C levels greater than 6.5%. Stroke was defined as any history of ischaemic cerebrovascular accident, haemorrhagic cerebrovascular accident, transient ischaemic attack or thromboembolic phenomena. Vascular disease was defined as any history of prior myocardial infarction, peripheral arterial disease or aortic plaque. Female sex (if age <65 years with no other risk factors, female sex independently does not increase risk). CHA2DS2-VASC is a risk stratification scoring system which is used for the assessment of stroke risk in patients with non- valvular atrial fibrillation¹⁰⁻¹². This scoring system is as follows

Clinical Features	Score
Congestive heart failure (EF <40%)	1
Hypertension (BP >140/90)	1
Age (≥75 years)	2
Diabetes Mellitus	1
Stroke/TIA/Thromboembolism	2
Vascular disease	1
Age (65-74 years)	1
Gender (female)	1
Total scores	9

Anti-thrombotic therapy is started on the basis of scoring system

Patients with score 0 are reasonable to omit any anti-thrombotic therapy (class-2a)

Patients with score 1 need no therapy or oral anti-coagulation or aspirin (class-2b)

Patients with score greater than or equal to 2 need anti-coagulation therapy (class-1)

All data was handled with care to maintain patient confidentiality. The data was analyzed with SPSS-23. Frequencies of different risk factors were calculated in terms of percentages. Population characteristics were summarized as SD for continuous variables and as percentages for qualitative variables.

RESULTS

Out of 100 patients enrolled, 60 were male (60%) and 40 were female (40%) which revealed a relatively higher burden of atrial fibrillation in males as compared to females. Age varied from

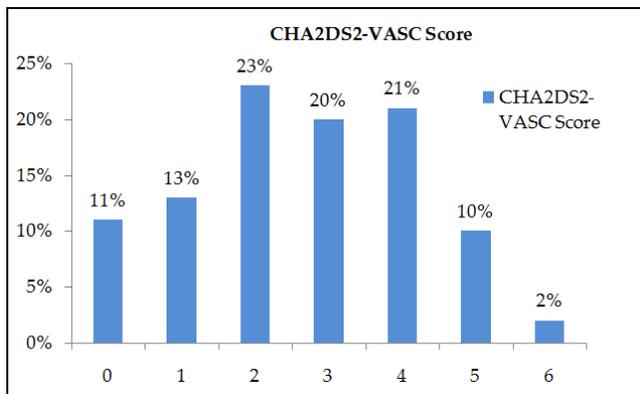


Figure: Percentage distribution of CHA2DS2-VASC score among patients with atrial fibrillation.

25 to 89 years with mean age 64.27 ± 12 years. Maximum number of patients i.e. 31 (31%) were between 65-74 years while a significant number of patients were either greater than or equal to 75 years (27%). Frequency of patients between 56-64 years was 23% while 8 (8%) were between 46-55 years of age. There were 7 (7%) patients between 36-45 years of age while in younger age group i.e. below and equal to 35 years were only 4 patients (4%).

Among the modifiable risk factors, hypertension is the most common risk factor (57%) followed by congestive heart failure (33%). Among other risk factors diabetes mellitus is the 3rd most common (18%). Vascular diseases and stroke are present in 14% and 13% respectively.

Paroxysmal atrial fibrillation was the most common type of atrial fibrillation observed (67%) followed by persistent atrial fibrillation (31%). Whereas, long standing persistent and atypical flutter were present in 1% patients each. The data discussed above is evident in the following frequency (table-I).

Table-I: Clinical characteristics of atrial fibrillation (n=100).

S. No.	Variables	Percentages	
1	Age (Mean ± SD)	64.27 ± 12.808 years	
	Age Groups	≤35 years	4%
		36-45 years	7%
		46-55 years	8%
		56-64 years	23%
		65-74 years	31%
		≥75 years	27%
2	Gender Risk		
	Female	40%	
	Male	60%	
3	Hypertension risk	57%	
4	Age Risk	55%	
5	Congestive Heart Failure risk	33%	
6	Vascular diseases	14%	
7	Stroke, TIA, Embolism	13%	
8	Diabetes Miletus	18%	
9	Atrial fibrillation classification	Paroxysmal	67%
		Persistent	31%
		Permanent	1%
		Atypical flutter	1%

The number of patients having CHA2DS2-VASC score 2 and greater than 2 are 76 (76%) whereas number of patients scoring >2 are 13 (13%). Among them 2, 3, 4, 5, 6 CHA2DS2-VASC score are 23 (23%), 20 (20%), 21 (21%), 10 (10), 2 (2%) respectively. Similarly, number of patients having 0 CHA2DS2-VASC score are 11(11%). As is evident in the following graph (figure).

DISCUSSION

The current study helped us to identify the prevalence of risk factors of atrial fibrillation in our local population, especially in people who are more prone to thrombo-embolic phenomena having higher CHA2DS2-VASC score. Like other countries, Pakistan is undergoing transition from communicable to non-communicable diseases and atrial fibrillation is a non-communicable disease. Among the non-modifiable risk factors, age was considered as the most important risk factor. As in our study, mean of age of presentation is 64.27 ± 12 years as compared to study conducted in Germany where mean age of presentation was 55 ± 5 years²¹. Second non-modifiable risk factor is gender. As we can see through results that major percentage of our study population is male^{21,22,12,13}. Female sex is considered to be an independent risk factor for thromboembolic phenomena¹⁰⁻¹³. This finding of gender distribution is also in line with published data on prevalence of atrial fibrillation by Framingham Heart Studies¹¹. However, in contrast, sex is not as independent predictor of all cause stroke in the Framingham Heart Study model¹¹.

Hypertension is among the modifiable risk factors which is most common among individuals. Especially, elderly age >75 years and hypertension when combined play a significant role to increase risk of stroke¹⁰. This study is validated by American Heart Association guidelines¹¹⁻¹⁵. Among the other risk factors, congestive heart failure (33%) was the 2nd most common risk factor followed by diabetes (18%), vascular phenomena (14%) and stroke/TIA/Thromboembolism (13%). The most interesting studies on the predictors of warfarin use in non-valvular atrial fibrillation patients are those by Go *et al*². Other investigators analyzed the positive and negative predictors of warfarin use in non-valvular atrial fibrillation. These studies revealed that a history of stroke and advanced age are independent predictors of warfarin use². As we can see in the above mentioned graph that CHA2DS2-VASC score of most of the patients is either 2 or greater than 2 which is a main indication for anti-thrombotic therapy

in these patients¹⁶. There are a significant number of patients which have either 0 score (11%) or 1 score (13%) which indicates that risk factor profile of atrial fibrillation is beyond above discussed factors¹⁷⁻²⁰. Atrial fibrillation itself is a major cause of heart failure in vascular diseases²⁰. Other risk factors like asthma, chronic kidney disease also contribute to atrial fibrillation²¹ but the variables discussed under the study are considered to be the main predictors of stroke and anti-thrombotic therapy in non-valvular atrial fibrillation²¹⁻²².

Limitations to my study are that data is very small. Although we increased the sample size as compared to that calculated through prevalence (2.7%)²¹ but even then, this was not large enough as compared to studies conducted in other countries. 2nd limitation is that patients with atrial fibrillation should be followed to study the stroke risk for prolonged period of time but this is not possible in our setting. As this is a single center study, therefore, results may not be generalized to other clinical settings.

CONCLUSION

Our findings highlight the relative prevalence of different risk factors of atrial fibrillation in our local population especially those risk factors present in CHA2DS2-VASC score contributing towards thromboembolic phenomena. Apart from prevalence of non-modifiable risk factors, we have a great number of patients with modifiable risk factors i.e. stroke, hypertension and diabetes mellitus. It is observed that adults with combinations of heart failure, hypertension, diabetes, advanced age and coronary artery disease are at higher risk of paroxysmal atrial fibrillation²¹. Risks associated with combinations are not always additive²². Rather, certain risk factors like advanced age (age greater than 75 years) and hypertension in particular are both prevalent and high risk²², contributing substantially to the incidence of atrial fibrillation. This also shows that a great number of our local population is becoming victim to atrial fibrillation because of sedentary life style. Therefore, there is need to conduct public awareness programs to make people aware of

these modifiable risk factors. Community based measures for screening and primary prevention should be implemented with emphasis on life style modification and younger population in particular should be motivated to adopt healthy life style behaviour to combat the globally increasing burden of atrial fibrillation as well as to limit the financial burden on country economy due to increasing disease prevalence. Patients having higher CHA₂DS₂-VASc score should especially be educated to modify their life style and ensure medicine compliance to decrease thromboembolic phenomena.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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