

**Assessment of Risk factors for Cardiovascular and Cerebrovascular Disorders using CHA2DS2-VASc Score**

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**Abstract**

**Background:** CHA2DS2-VASc score is applied majorly for the prediction of risk of stroke and systemic emboli in patients with Atrial Fibrillation (AF). HTN (Hypertension), T2DM (Type 2 Diabetes Mellitus), Obesity, Hyperlipidemia, Male gender and Social habits were major risk factors for cardiovascular disorders. HTN, increased waist to hip circumference ratio, smoking, high saturated diet, physical inactivity, Hyperlipidemia, T2DM and alcohol were major risk factors for cerebrovascular disorders.

**Materials and Method:** This is a prospective observational study. Parameters such as age, gender, past medical history, diagnosis, social history, familial history and CHA2DS2-VASc score were collected.

**Results:** According to CHA2DS2-VASc severity, majority of the patients require Warfarin/Dabigatran

therapy out of which 8 patients were diagnosed with AF & 151 patients were non AF patients.

1.4 Conclusion: Most of the patients fall under warfarin/dabigatran category where HTN, T2DM and Male gender are frequently scoring parameters. Pharmacist can play a major role in educating the patients regarding disease process, proper adherence towards medications and risk stratification.

**Keywords:** Atrial fibrillation, Cardiovascular disorders, Cerebrovascular disorders, Risk factors.

**Introduction**

To predict the risk of stroke and systemic emboli in patients with Atrial Fibrillation (AF), CHA2DS2-VASc (congestive heart failure, hypertension, age  $\geq$  75 years, diabetes mellitus, stroke or Transient Ischemic Attack (TIA), vascular disease, age 65 to 74 years, sex category) score is applied majorly.<sup>[1]</sup> It is estimated that

cardiovascular diseases (CVDs) are the number one cause of death globally, leading to 17.9 million deaths per year [2] and cerebrovascular diseases leads to 5 million deaths per year.[3]

CAD (Coronary Artery Disease) includes atherosclerosis, angina and acute coronary syndrome (ST elevated myocardial infarction, Non-ST elevated myocardial infarction).[4] Cerebrovascular diseases include Transient Ischemic Attack (TIA), Ischemic stroke & Hemorrhagic stroke.[3]

Following are the major risk factors for cardiovascular disorders:

- a) HTN (Hypertension)
- b) T2DM (Type 2 Diabetes Mellitus)
- c) Obesity
- d) Over weight
- e) Hyperlipidemia
- f) Age (>45 in men and >55 in women)
- g) Male gender
- h) Familial history of CAD
- i) Social Habits (Smoking & Alcohol)[5]

Following are the risk factors for cerebrovascular disorders:

- a) Non- modifiable risk factors: Age (>55 years), Male gender, Black race
- b) Modifiable risk factors: HTN, Increased waist to hip circumference ratio, Smoking, high saturated diet, Physical inactivity, Hyperlipidemia, T2DM, Alcohol and Genetic causes.[6]

The current study aims to evaluate the CHA2DS2-VASc score in patient suffering AF and without AF

### Method and materials

The study was performed at private cardiology and neurology outpatient clinics, Warangal for a period of 2 months after the approval of Institutional Ethics Committee (IEC). Study population consists of 184

patients who had already diagnosed with cardiovascular and cerebrovascular disorders which range from age group of 15 to 89 years. The data was assessed using CHA2DS2-VASc score, with certain parameters such as gender, past medical history (HTN, T2DM, GAD (Generalized Anxiety Disorder), COPD (Chronic Obstructive Pulmonary Disease), Hypothyroidism, RA (Rheumatoid Arthritis), Asthma, CKD (Chronic Kidney Disease), PUD (Peptic Ulcer Disease), Epilepsy, UTI(Urinary Tract Infection), Parkinsonian disorder, Neuralgias, PIVD (Prolapse Intervertebral Disease), BPPV (Benign Paroxysmal Positional Vertigo) and CAD), social history and familial history.

### Results

#### Age

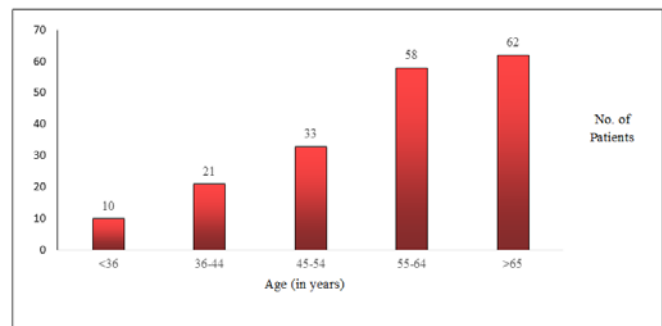


Figure 1: (Age v/s No. of patients)

Figure 1 represents the age of the patients' v/s number of patients, therefore patients from age group >65 years were higher in our study. The mean age was found to be 56.9 years.

#### Gender

In our study, 104 patients were male and 80 patients were female.

#### Past medical history

Table 1: represents the past medical history v/s number of patients. Therefore patients with HTN are more in number followed by T2DM.

Past Medical History	No. of Patients
HTN	118

T2DM	54
GAD	1
COPD	2
Hypothyroidism	8
RA	1
Asthma	2
CKD	4
PUD	1
Epilepsy	5
UTI	1
Neuralgias	2
PIVD	2
BPPV	1
CAD	4

**Classification of the patients according to cardiovascular or cerebro-vascular diagnosis**

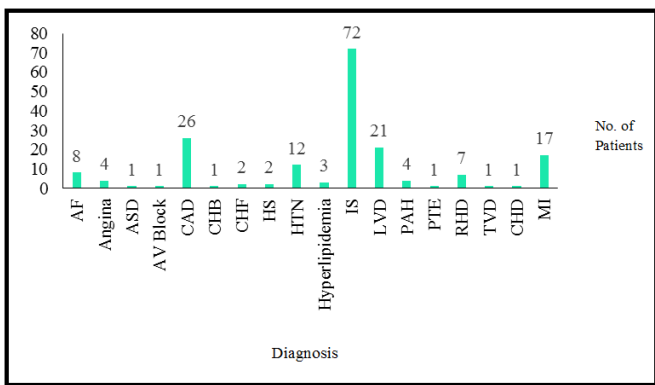


Figure 2: Diagnosis v/s No. of Patients

Most of the patients were diagnosed with Ischemic stroke, CAD and MI.

**Social History**

6 patients have current history of smoking and 4 patients have current history of alcohol abuse.

**Familial history**

1 patient out of 184 was suffering from familial history of CAD.

**CHA2DS2-VASc severity (according to AHA guidelines<sup>[7]</sup>)**

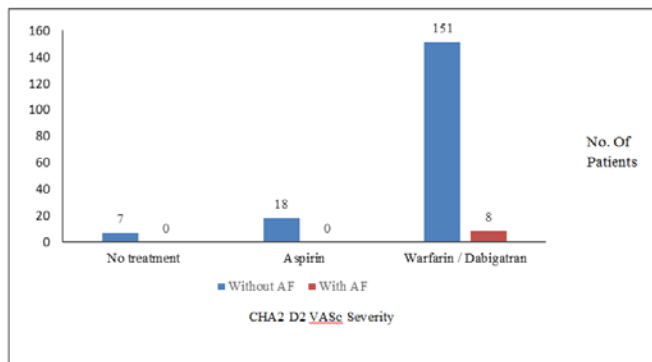


Figure 3: CHA2 D2 VASc Severity/No. of Patients

According to CHA<sub>2</sub>DS<sub>2</sub>-VASc severity majority of the patients require Warfarin/Dabigatran therapy out of which 8 patients were diagnosed with AF & 151 patients were non AF patients.

**Discussion**

It is estimated that 17.9 million deaths per year worldwide are due to cardiovascular disorders, [2] 5 million die and another 5 million per year are left permanently disabled due to cerebrovascular disorders. [3]

In our study, the mean age was found to be 56.9 years, this is in consonance to the study conducted by *Elvin Zegin et al.*, where the mean age was found to be 61.9 years. [8] In the study conducted by *T. Sekri et al.*, the mean age was found to be 44.34 years which is in contrast to our study. [5] This may be due to reduced water content and increased fat tissue in the body in consistency with age leading to imbalance between atherosclerotic & anti atherosclerotic factors.

Of total study population, male were 56.5 % and female were 43.4 %. This is in consistent with the study conducted by *Chen-Yu Li et al.*, where the male population was found to be 63.6 %. [9] In the study conducted by *Christine Parsons et al*, the male population was found to be 46% which is in contrast to

our study.<sup>[1]</sup> This might be due to protective effect of endogenous estrogens and progesterones in female towards vascular endothelium.<sup>[10]</sup>

HTN & T2DM were the most prevalent risk factors observed in our study. In the study conducted by *Christine Parsons et al.*, HTN & T2DM were major assessed risk factors which are similar to our study.<sup>[1]</sup> In contrast to our study conducted by *ZN Hatmi et al.*, the major risk factors were found to be Hyperlipidemia and smoking.<sup>[11]</sup> This may be due to consumption of high salt and high saturated fat diet which may provoke the occurrence of HTN & T2DM.

In our study Ischemic stroke (72) and CAD (26) were the most diagnosed disease patterns. In consistent to our study, *Viviane de Souza Pinho Costa et al.* had documented that 196 patients were suffering from Ischemic stroke and 106 patients were suffering from CAD, of 454 patients.<sup>[12]</sup> This may be due to higher prevalence of HTN & T2DM that alters vascular physiology.

5.4 % of the patients in our study were addicted to social habits. Similar to our study, *Alexandera Gonclaves et al.*, had stated that prevalence of social habits were lower in 18.5 % of the patients.<sup>[13]</sup> In contrast to our study, social habits were prevalent in 21.6 % of the patients in the study conducted by *ZN Hatmi et al.*<sup>[11]</sup> This may be due to increased awareness about social habits in our patients.

0.5 % of the patients in our study were suffering from familial history of CAD. In the study conducted by *Leo E. Akioyamen et al.*, the familial history was found in 0.6 % of the patients.<sup>[14]</sup> This may be due to genetic factors.

CHA2DS2VASc score, consists of congestive heart failure, hypertension, age, diabetes, stroke/transient ischemic attack/thromboembolism, vascular disease,

and sex as scoring factors. It is useful for the assessment of risk factors in AF patients.

Table 2: Scoring of CHA2DS2VaSc<sup>[7]</sup>

CHA2D2VaSc	Score
Congestive Heart Failure / Left Ventricular Dysfunction	1
Hypertension	1
Age (≥ 75 years)	2
Diabetes Mellitus	1
Stroke/TIA	2
Vascular disease (prior MI, PAD, or aortic plaque)	1
Age (65-74 years)	1
Sex (Female)	1
Maximum score	9

Table 3: Interpretation<sup>[7]</sup>

Score	Risk	Anti-coagulation therapy	Considerations
0	Low	No treatment	
1	Moderate	Aspirin	
≥ 2	High	Warfarin or Dabigatran	Warfarin: should be dosed to attain INR 2-3 Dabigatran  Age < 80 years: 80 – 150 mg BD ( if creatinine clearance >30mL/min)  Age < 80 years: 110mg BD

In our study, 7 patients falls under “no treatment’ category, 18 patients falls under “aspirin’ category and 159 patients (Non AF=151, AF=8) falls under “warfarin/dabigatran” category and mean score of our study was found to be 3. In consonance to our study, the mean score documented by *Chen-Yu Li et al.*, was 3.34.<sup>[9]</sup> In contrast to our study, no. of patients fall under no treatment, aspirin and warfarin/dabigatran category were 38, 118 and 38 respectively which was conducted by *Noriaki Tabata et al.*<sup>[15]</sup> This might be due to endothelial dysfunction and hypercoagulability indicating that platelet activation might be attributed to underlying risk factors for high score of CHA2DS2 VASc.

### Conclusion

In our study population, most of the patients fall under elderly category. According to CHA2DS2 VASc scale, most of the patients fall under warfarin/dabigatran category where HTN, T2DM and Male gender are frequently scoring parameters. Most of the patients were diagnosed with non AF diseases. Pharmacist can play a major role in educating the patients regarding disease process, proper adherence towards medications, screening for drug interaction, risk stratification and proper management of co morbidities and complications associated with cardiovascular as well as cerebrovascular diseases. Following Mediterranean and DASH (Dietary Approach to Stop Hypertension) with lifestyle modifications such as regular aerobic exercise, smoking cessation and avoiding alcohol consumption may reduce the risk of cardiovascular and cerebrovascular disorders.

### Acronyms

AF: Atrial Fibrillation

BD: Twice Daily

BPPV: Benign Paroxysmal Positional Vertigo

CAD: Coronary Artery Disease

CKD: Chronic Kidney Disease

COPD: Chronic Pulmonary Obstructive Disease

CVD: Cardiovascular Disease

GAD: Generalized Anxiety Disease

HTN: Hypertension

INR: International Normalized Ratio

NSTEMI: Non-ST elevated myocardial infarction

PIVD: Prolapse Intervertebral Disease

PUD: Peptic Ulcer Disease

RA: Rheumatoid Arthritis

STEM: ST elevated myocardial infarction

T2DM: Type 2 Diabetes Mellitus

TIA: Transient Ischemic Attack

UTI: Urinary Tract Infections

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### Declaration

The author declares that all of the authors have reviewed this article and have contributed in producing this article.

### Authors’ contribution

All authors’ are contributed equally

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