



Prevalence of First Diagnosed Atrial Fibrillation in Patients Admitted with Acute Coronary Syndrome and with Impaired Renal Function with and without Diabetes Mellitus

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To determine the prevalence of first diagnosed atrial fibrillation in patients admitted with acute coronary syndrome and with impaired renal function with and without diabetes mellitus.

Methodology: A total of 434 patients were selected from two different hospitals, 361 from NICVD, Tando Muhammad Khan and 73 from Isra University Hospital, Hyderabad. Both males and females, aged between 18 years to 70 years, first ever presented & admitted with acute coronary syndrome (ACS) and renal impairment were included and whereas, patients with atrial fibrillation (AF) other than first diagnosed, previous history of myocardial infarction/coronary artery bypass

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grafting (CABG), known case of chronic kidney disease/on dialysis, history of cerebrovascular accident (CVA), patient with valvular heart disease, and pregnant women were excluded from this study. Baseline and clinical data was collected to determine the association with the prevalence of first diagnosed AF through chi-square test and a p value of <0.05 was considered as statistically significant.

Results: The mean age \pm SD was 49.32 ± 12.47 years. Among them majority were males 66.35% and rural residents 51.15% respectively. The most common risk factor observed in our study was presence of hypertension (N = 231, 53.22%) and among all ACS patients, most common type of ACS was unstable angina (N = 195, 44.93%). The overall prevalence of first diagnosed atrial fibrillation was 12.44% (N = 54) and the overall prevalence of diabetes mellitus was 39.63% (N = 172). Mean random blood sugar levels in diabetic patients was 203.32 ± 105.60 mg/dL, hypertensive patients with DM (48.14%), and patients with STEMI with DM (12.96%) were significantly associated with increased prevalence of first diagnosed atrial fibrillation, p value <0.05.

Conclusion: Prevalence of first diagnosed AF is comparatively higher in our study because of the underlying renal impairment. Modifiable risk factor like uncontrolled blood sugar levels has significance association with first diagnosed AF.

Keywords: First diagnosed AF; ACS and renal impairment; diabetics; Pakistan.

1. INTRODUCTION

Atrial fibrillation (AF) is the common cardiac arrhythmias patients experience having underlying coronary artery disease (CAD) including those admitted with acute coronary syndrome or acute myocardial infarction (ACS) [1-3]. Latest European Society of Cardiology (ESC) for the prevention, diagnosis, and management of patients with AF estimates that there is around 2% - 4% (43.6 million) of the adult population in the world and 6.5% in Pakistan is affected by this disease and in the upcoming era the burden is expected to rise more than 2.5 folds because of the increasing comorbidities such as age (increased life expectancy), hypertension, diabetes mellitus, CAD, chronic kidney disease (CKD), obesity, and obstructive sleep apnoea (OSA) and the burden of this disease even higher when patient is having underlying diabetes mellitus (DM) [4].

A study conducted by Rubenstein JC [5] has shown that around 10% of the admitted patients with ACS experience AF irrespective of their diabetic status while another study has shown that patients with DM are more likely to experience AF (14.4%) as compared to those without DM (11.2%) [6] and this burden is observed even higher in patients with chronic kidney disease ranging from 13% to 23% [7].

Atrial fibrillation not diagnosed before, irrespective of its duration and severity is called first diagnosed/first detected AF. Data regarding first diagnosed AF in patients who admitted with ACS and having underlying renal impairment with and without DM has not been observed

previously. That is why we have planned to conduct this study in such patients to scientifically determine the burden of this disease as patients with this disease are associated with high rates of morbidity, mortality, and associated complications.

2. METHODOLOGY

This observational study has been conducted in the department of Cardiology of two different hospitals. Out of a total of 434 patients that were selected for the study, 361 patients were extracted from National Institute of Cardiovascular Disease (NICVD), Tando Muhammad Khan while 73 patients from Isra University Hospital (IUH), Hyderabad. All the patients were briefed about the study before enrolment. The inclusion criteria for this study was, both males and females, aged between 18 years to 70 years, first ever presented & admitted with ACS and renal impairment. Exclusion criteria for this study was, AF other than first diagnosed, previous history of myocardial infarction/coronary artery bypass grafting (CABG), patients known case of chronic kidney disease/on dialysis, history of cerebrovascular accident (CVA), previous history of AF, patient with valvular heart disease, and pregnant women.

Diagnosis of acute coronary syndrome was made based on the Fourth universal definition proposed by the American College of Cardiology [8]. First Detected/Diagnose AF is labeled when the patient had irregularly irregular rhythm on ECG for the first time for at least more than 10 minutes using the criteria proposed in the ESC

guidelines [9] Patients were labeled as impaired renal functions if they had serum creatinine more than 1.2mg/dL (cut off set by the local test performing laboratories). Diabetes mellitus were labeled if the patient already taking anti-diabetic medications or random blood sugar more than 200mg/dL or HbA1C levels more than 6.5% as proposed in the guidelines of American Diabetes Association [10]

Data was collected for baseline demographic variables (like age, gender, area of residence, BMI, and smoking) and clinical (such as type of ACS, presence of AF, presence or absence of DM, hypertension, random blood sugar levels, and levels of serum creatinine. Statistical package for the social sciences (SPSS v. 21) was used for the data entry and final analysis. Quantitative variables were expressed as mean \pm SD while categorical variables presented as frequencies and percentages. A chi-square test was applied to determine the association between presence of AF with different risk

factors such as renal impairment, age, and blood sugar levels. P value of <0.05 was considered as statistically significant.

3. RESULTS

A total of 434 patients were enrolled for final analysis and their mean age \pm SD was 49.32 \pm 12.47 years. Among them majority were males as compare to females, 66.35% and 33.64% respectively. Urban and rural residents were observed almost with similar percentage, 48.84% and 51.15% respectively. More than 70% of the study subjects had normal BMI. The most common risk factor observed in our study was presence of hypertension (N = 231, 53.22%) and among all ACS patients, most common type of ACS was unstable angina (N = 195, 44.93%). The overall prevalence of first diagnosed atrial fibrillation was 12.44% (N = 54) and the overall prevalence of diabetes mellitus was 39.63% (N = 172). All this description has shown in Table1.

Table 1. Baseline demographic and clinical characteristics of acute coronary syndrome patients with renal impairment (n = 434)

Variables	N	%
Gender		
Male	288	66.35
Female	146	33.64
Area of Residence		
Urban	212	48.84
Rural	222	51.15
BMI		
Underweight (<18.5)	10	2.3
Optimal (18.5 - 25)	308	70.96
Overweight (25 - 30)	98	22.5
Obese (>30)	18	4.14
Dyslipidemia		
Yes	199	45.85
No	235	54.14
Smoking		
Yes	153	35.25
No	281	64.74
Hypertension		
Yes	231	53.22
No	203	46.77
Type of ACS		
Unstable Angina	195	44.93
NSTEMI	132	30.41
STEMI	107	24.56
Diabetes Mellitus		
Yes	172	39.63
No	262	60.36
First Detected/ Diagnosed AF		
Yes	54	12.44
No	380	87.55

Table 2 shows risk factors associated with increased prevalence of atrial fibrillation in admitted ACS patients having renal impairment with and without DM. Mean random blood sugar levels 203.32 ± 105.60 mg/dL in diabetic patients, hypertensive patients with DM (48.14%), and patients with STEMI with DM (12.96%) were significantly associated with increased prevalence of first diagnosed atrial fibrillation, p value < 0.05 .

4. DISCUSSION

Atrial fibrillation is the most important cause of hospitalization, associated complications include stroke, and mortality. It is estimated that after the age of 55 years every 1 person out of 4 is prone to develop AF in Europe and among them males are more prevalent than females while data is lacking in Pakistan. Increase in the risk factors of AF such as age more than 55 years, hypertension, diabetes mellitus, chronic obstructive pulmonary disease (COPD), CKD, CAD, and OSA is directly associated with increase in the burden of AF. Patients with multiple risk factors have > 2.5 folds chance for the development of AF as compared with no risk factor or less than 2 risk factors [11-14]. The mean age of patient who experience AF without

looking at their type of AF is around 66 years in developed country while in developing country it is > 50 years and it is more common in women than men [15]. On the other hands, observations from our study have shown that mean age of the patients developed AF was 49 years and it was more common in men than women. The difference could be due to the selection in the patients, as in our study we have included high risk patients (having underlying renal impairment) those who are more prone to develop AF while their data only included general population. A review conducted by the Lau YF and colleagues have shown that hypertension is the most common attributed risk factor of AF [16]. The same findings observed in the present study might be due to the underlying pathophysiology involved which leads to the development of AF.

The prognostic significance of new-onset AF is different from the pre-existing AF so studies suggest that pre-existing AF is associated with worse outcome as compare to new-onset AF in patients with ACS [17-19]. In our study the overall prevalence of first diagnosed AF in patients admitted with ACS and underlying having renal impairment was 12.44%. While a study conducted by Wang CL has observed the prevalence of first diagnosed AF in patients with

Table 2. Risk factors associated with first diagnosed af in patients with acs and renal impairment with and without dm (n = 54)

Risk Factors	Mean \pm SD			p value
	Overall	Diabetics	Non-Diabetics	
Continuous Variables				
Age - years	49.32 \pm 12.47	54.13 \pm 11.05	48.10 \pm 9.81	0.09
BMI - kg/m ²	22.09 \pm 4.88	24.04 \pm 3.68	23.34 \pm 5.25	0.24
Serum Creatinine - mg/dL	1.2.02 \pm 3.22	1.5.35 \pm 4.91	1.3. \pm 12.47	0.04
RBS - mg/dL	159.46 \pm 97.14	203.32 \pm 105.60	198.81 \pm 64.18	0.001*
Categorical Variables	N (%)			
Gender				
Male	31 (54.40)	11 (20.37)	20 (37.03)	0.31
Female	23 (42.59)	5 (9.25)	18 (13.33)	
Dyslipidemia				
Yes	14 (25.92)	8 (14.81)	6 (11.11)	0.09
No	40 (74.07)	8 (14.81)	32 (59.25)	
Smoking				
Yes	25 (46.29)	12 (22.22)	13 (24.07)	0.23
No	29 (53.70)	9 (16.66)	20 (37.03)	
Hypertension				
Yes	32 (59.25)	26 (48.14)	6 (11.11)	0.03*
No	22 (40.74)	13 (24.07)	9 (16.66)	
Type of ACS				
Unstable Angina	30 (55.55)	12 (22.22)	18 (33.33)	0.001
NSTEMI	15 (27.77)	6 (11.11)	9 (16.66)	
STEMI	9 (16.66)	7 (12.96)	2 (3.70)	

*a p value of < 0.05 is considered as statistically significant

ACS ranging from 4.0% to 10.2% [20]. Higher prevalence in our study was due to the presence of renal impairment which was not assessed in previously conducted study. It means patients having underlying renal impairment are 2.4% more prone to experience AF during the hospitalization period of ACS. In our study only patients with hypertension, raised mean blood sugar levels, and patients with STEMI were significantly associated with high prevalence of AF with DM as compared to non-diabetics. The findings of our study also consistent with the findings of previously conducted studies and these studies claimed individual risk factor as an independent cause of AF and the prevalence become increase as the risk factors become increases [1,21-25]

Our study has certain limitation such as we did not observed outcome of such patients like complications associated with AF, episodes of AF during hospitalization, and medical therapy they received during hospitalization. These factors should be addressed in future studies which may help in the management of such patients.

5. CONCLUSION

Most common entity, renal impairment in patients with ACS and diabetes mellitus is getting more prevalent with associated adverse effects like AF. Prevalence of first diagnosed AF is comparatively higher in our study because of the underlying renal impairment. Modifiable risk factor like uncontrolled blood sugar levels has significant association with first diagnosed AF.

CONSENT AND ETHICAL APPROVAL

Before commencement of the study, ethical approval from the hospital and informed consent from the patients/attendant were taken.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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