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Study Impact of Hyperuricemia on the Occurrence of Atrial Fibrillation in Patients Admitted to CCU in Al-Diwaniyah Teaching Hospital

Mazin Zamel Al-Shibani[1], Hend Saddam Asmaaeel[2]

[1]M.B.Ch.B., F.I.C.M.S./ Professor/Consultant Physician / department of Medicine/ College of Medicine/ University of Al-Qadisiyah / Al-Diwaniyah province/ Iraq, [2] M.B.Ch.B/ Al-Diwaniyah Teaching Hospital/ / Al-Diwaniyah Province/ Iraq

Abstract

Background: A possible direct link between SUA and AF has barely been addressed. Several studies have reported an association between SUA and AF. An increasing body of evidence suggests that SUA may represent a marker of AF risk. The association between SUA level and AF has been demonstrated. Moreover, Nyrnes A et al. found that serum uric acid levels in men are higher than in women throughout life, although SUA levels increase after menopause, and that baseline SUA was associated with an increased risk for future AF in both sexes. In addition, the occurrence of AF increases with age, and the fact that SUA levels in women, in contrast to men, increase with age may account for the higher risk estimates seen in women.

Aim of the study: To evaluate the possible association between serum uric acid and atrial fibrillation in patients admitted to coronary care unit.

Patients and Method: In this hospital based study, in order to explore the prevalence rate of hyperuricemia in patients with atrial fibrillation, the coronary care unit in Al-Diwaniyah teaching hospital was prospectively reviewed for newly admitted patients with atrial fibrillation during the period extending from April the 15th 2019 through July the 15 the 2019.

Results: A cross sectional study enrolled 191 patients with cardiac problems. The study result revealed 53.4% of cases were males and 46.5% were females; the male to female ratio was 1: 1.14. The mean age of all patients was 51.9±4.6 years. The patients were examined and investigated for the presence of atrial fibrillation and then were divided into two groups, atrial fibrillation positive (20.5 %) and atrial fibrillation negative (77.5 %). Hyperuricemia was significantly associated with atrial fibrillation ($P < 0.001$) and the risk subjected by hyperuricemia was 3.5 in terms of odds ratio.

Conclusion: There was significant association between hyperuricemia and presence of atrial fibrillation in patients admitted to CCU indicating that hyperuricemia is a risk factor for AF development.

Key words: *Atrial fibrillation, hyperuricemia, Iraq*

Introduction

Atrial fibrillation is the most common type of heart arrhythmia. It is due to abnormal electrical activity within the atria of the heart causing them to fibrillate. Is characterized as a tachyarrhythmia, which means that the heart rate is often fast. This arrhythmia may be paroxysmal (less than 7 days) or persistent (more than 7 days). Due to its rhythm irregularity, blood flow through the heart becomes turbulent and has a high chance of forming a thrombus (blood clot) which can ultimately dislodge and cause a stroke. Atrial fibrillation is the leading cardiac cause of stroke. Risk factors for atrial fibrillation include advanced age, high blood pressure, underlying heart and lung disease, congenital heart disease, and increased alcohol consumption. Symptoms vary from asymptomatic to symptoms such

as chest pain, palpitations, fast heart rate, shortness of breath, nausea, dizziness, diaphoresis (severe sweating), and generalized fatigue. Although atrial fibrillation may be a permanent disease, various treatments have been developed, and risk modifying strategies to help reduce the risk of stroke in patients that remain in atrial fibrillation exist. Treatments include anticoagulation, rate control medication, rhythm control medication, cardioversion, ablation, and other interventional cardiac procedures [1, 2].

A possible direct link between SUA and AF has barely been addressed. Several studies have reported an association between SUA and AF [3] . An increasing body of evidence suggests that SUA may represent a marker of AF risk. The association between SUA level and AF has been demonstrated. Moreover, Nyrnes A *et al* [3] found that serum uric acid levels in men are higher than in women throughout life, although SUA levels increase after menopause, and that baseline SUA was associated with an increased risk for future AF in both sexes. In addition, the occurrence of AF increases with age, and the fact that SUA levels in women, in contrast to men, increase with age may account for the higher risk estimates seen in women [3] .

Furthermore, in a small observational study, Letsas et al. showed a stepwise increase of SUA levels in patients with paroxysmal AF and permanent AF compared to control subjects, while after multivariate analysis, SUA was an independent predictor of permanent [4] (Letsas *et al*., 2010). Also, in a retrospective observational study of hospitalized patients over 40 years an independent association between high SUA levels and AF (paroxysmal or persistent) was evident [5] . In the ARIC study, a large prospective cohort study, elevated SUA was associated with a greater risk of AF development during the follow-up [6] . In the same line, a Japanese hospital-based cohort study demonstrated an independent association between SUA and AF [7]. Another very recent study showed that SUA levels ≥8 mg/dl was an independent predictor of AF while SUA increased significantly between the last year and the year of the first AF detection suggesting a possible involvement in AF development. Besides, Tze-Fan Chao et al. showed that hyperuricemia was associated with a larger left atrial size and may be a novel risk factor for the development of AF. K. Letsas et al. also found an independent association between increased levels of SUA and permanent AF [4].

The poverty of national reports and limited numbers of Iraqi studies dealing with the association of atrial fibrillation and hyperuricemia in Iraqi patients and based on the clinical daily observation in coronary care center in Al-Diwaniyah province, Mid-Euphrates region of Iraq, we planned and conducted the current study to disclose the possible association between hyperuricemia and atrial fibrillation in Iraq.

The aim of the present study was to evaluate the possible association between hyperuricemia and atrial fibrillation.

Patients and Methods

In this hospital based study, in order to explore the prevalence rate of hyperuricemia in patients with atrial fibrillation, the coronary care unit in Al-Diwaniyah teaching hospital was prospectively reviewed for newly admitted patients with atrial fibrillation during the period extending from April the 15th 2019 through July the 15 the 2019. Any patient admitted to CCU during the period of the study was enrolled in the current study. Any patient who refused to participate in the current study and patients who were unfortunately unable to complete interview questionnaire were excluded from study. Following application of these exclusion criteria, the sample of included patients became 191.

The following variables were included in the questionnaire form: Age, gender, occupation, education level, residency, socioeconomic status, marital status history of smoking, history of alcoholism, history of chronic illness, the main presenting clinical features. Investigations included ECG findings, serum uric acid and thyroid function test in addition to CBC, LFT, RFT, Lipid profile, cardiac biomarkers. Echocardiographic findings were also included. The study was approved by the institutional ethical approval committee and formal agreement was obtained from the directorate of Health in Al-Diwaniyah province, the formal representative of Iraqi Ministry of health. Data were collected and transformed into a spread sheet of Microsoft Office Excel 2010 and then into an SPSS (statistical package for social sciences) version 23. Numeric quantitative data were expressed as mean, range and standard deviation (SD), whereas, qualitative data were expressed as number and percentage. Comparison of mean between any two groups was done according to independent sample t-test, while chi-square test was used to evaluate association between any two categorical variables. The

level of significance was considered at $P \leq 0.05$.

Results

A cross sectional study enrolled 191 patients with cardiac problems The study result reveal 53.4% of sample were male and 46.5% were female, in ratio1: 1.14, with mean age for all sample 51.9±4.6 years. After patients examination by physician and ECG finding, classified patients into groups in according to present of atrial fibrillation. Twenty point five percent of patients were had atrial fibrillation and 77.5% percent of patients had other cardiac problems rather than AF. Sixty seven out of 191 patients had hyperuricemia and 124 had no hyperuricemia. There was highly significant association between hyperuricemia and AF ($P < 0.001$) with an odds ratio of 3.15 (95 % confidence interval of 1.73 to 7.08) and an etiologic fraction of 0.42, as shown in table 1. However, there was no significant association between AF and any of other patients' characteristics, table 2.

Table 1: Association between hyperuricemia and atrial fibrillation

AF	Hyperuricemia				P †	OR	95 % CI	EF
	Positive n = 67		Negative n = 124					
	n	%	n	%				
Positive	25	37.3	18	14.5	< 0.001 HS	3.51	1.73 - 7.08	0.42
Negative	42	62.7	106	85.5				

†: Chi-square test; HS: highly significant at $P \leq 0.01$; OR: odds ratio; CI: confidence interval; EF: etiologic fraction

Table 2: Association between atrial fibrillation and other possible risk factors

Factor	*P*
Gender	> 0.05 NS
Age	> 0.05 NS
Hypertension	> 0.05 NS
IHD & Heart failure	> 0.05 NS
Valvular heart disease	> 0.05 NS
Mixed group	> 0.05 NS
IHD & Thyroid disease	> 0.05 NS
IHD & Kidney disease	> 0.05 NS
IHD & Diabetes mellitus	> 0.05 NS
IHD & Smoking	> 0.05 NS
IHD & CVA	> 0.05 NS

NS: Not significant at $P > 0.05$

Discussion

Atrial fibrillation newly becomes highly health problems worldwide due to largely relation to elevate diseases burden and increase death rate in general. In previous study reported AF prevalence 2.4%-3.5% in general population. Which was estimated more than 30 million of population survive with AF [8] . Patients with AF had been rise incidence of other diseases such as stroke, dementia and heart failure etc [9] . Many theories appear to explain pathophysiology and predisposing factors to AF. That had been reported a reaction of oxidative factors that cause inflammation in cell level [10] .

Numerous new studies expected the inflammation and oxidative processes behind the development of AF, in same way with presence of other predisposing factors like increase age of patient [8] .

The serum uric acid had been implicated to proceeding the inflammation pathways and oxidation processes in many pathological states of different diseases one of them AF. Also related to AF in accompany of others diseases such as hypertension, heart failure, hemodialysis and diabetes. Serum uric acid is the end product of purine catabolism. In our cross sectional study was revealed 43 out of 191 had AF (22.5%), which was more than reported in china studies, one of them did in Yunnan hospital reported AF prevalence in patients of age 80 years equal to 0.9% of patients treated in that hospital. Another study recorded prevalence AF 6% of 350 patients in suburban area similar risk factors. In addition a large number study in wide geographical region include more than 1000 patients reported AF prevalence in older patients equal 9% [11] . In north of Iraq a study by reveal AF prevalence among stroke patients in ward of three hospital 17.5% of middle and older patients [12]. For same study design in south of Iraq 9.8% of stroke patients that admitted to hospital associated with AF [13].

In conclusion, there was significant association between hyperuricemia and presence of atrial fibrillation in patients admitted to CCU indicating that hyperuricemia is a risk factor for AF development.

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the department of Medicine/ College of Medicine/ University of Al-Qadisiyah / Al-Diwaniyah province/ Iraq and all experiments were carried out in accordance with approved guidelines.

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