

# Effect of Age on Other Risk Factors of Atrial Fibrillation

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## ABSTRACT

**Background:** Atrial fibrillation is a supraventricular tachyarrhythmia characterized by uncoordinated atrial activation with consequent deterioration of atrial mechanical function.

**Objectives:** To demonstrate the effect of age on other risk factors of atrial fibrillation.

**Methods:** This is a descriptive cross-sectional study carried out in Ibn Albitar Cardiac Center for 191 patients with atrial fibrillation who attended the selected center for any complaint. Their age was ranging from 18 years and above of both sexes.

**Results:** Most of the patients (54.45%) fall in the age group between 40-65 years, 34.55% of patients were >65 years and 10.99% of patients were <40 years. The age has no significant effect on atrial fibrillation in obese patients. Positive family history was found in a non-significant high rate in those patients less than 40 years old. Hypertension and atrial fibrillation frequently coexist and their prevalence increases rapidly with age. History of ischemic heart disease was significantly more in the age group more than 65 years. Nearly all patients (97.4%) with diabetes and atrial fibrillation were in the age group more than 40 years.

**Conclusion:** The incidence of atrial fibrillation is age related and age has an important effect on certain risk factors.

**Keywords:** Atrial fibrillation, Effect of age, Risk factors.

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Atrial fibrillation (AF) is a supraventricular arrhythmia characterized electrocardiographically by low amplitude baseline oscillations (fibrillatory or f waves from the fibrillating atria) and an irregularly irregular ventricular rhythm<sup>(1)</sup>. Atrial fibrillation is the most common arrhythmia treated in clinical practice and the most common arrhythmia for which patients are hospitalized; approximately 33% of arrhythmia-related hospitalizations are for AF<sup>(1)</sup>.

The prevalence of AF in the general population increases steadily with advancing age, from 0.12-0.16% in people younger than 49 years, to 3.7-4.2% in those aged 60-70 years. Beyond the age of 80 years, prevalence can be as high as 10-17%<sup>(2)</sup>.

In addition to advancing age, several short-term risk factors for incident atrial fibrillation have been identified. Established risk factors for developing atrial fibrillation within 10 years include cigarette smoking, alcohol misuse, hypertension, obesity, diabetes, myocardial infarction, and heart failure<sup>(3)</sup>. The accumulation of risk factors imposes an additive risk for developing atrial fibrillation<sup>(4)</sup>.

The aim of this study is to demonstrate the effect of age on other risk factors of atrial fibrillation.

## Methods

This is a descriptive cross-sectional study was conducted from the second of January 2012 to the first of April 2012 in Ibn Albitar Cardiac Center in Baghdad city. The study population included 191 patients who were interviewed according to a questionnaire. The questionnaires were filled by the researcher through direct interview with the study population. All the

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patients were subjected to the following investigations: electrocardiography; echocardiography; chest X-ray and thyroid hormones estimation. Some of the patients were subjected to cardiac catheterization.

Paired t-test was applied to compare the mean  $\pm$  standard deviation of continuous variables. Chi square test was used to test the significance of categorical associations. Statistical package for social sciences version 18(SPSSv.18) was used for data analysis, a P-value equal or less than 0.05 was considered statistically significant.

## Results

A total of 191 patients were enrolled in the study. Ninety-eight patients (51.3%) were male, and ninety-three patients (48.7%) were female.

The more frequent age group for both sexes was between (40-65 years). The least age group was <40 years. In the age group above 65 years, 27 patients (40.9%) were male while 39 patients (59.1%) were female, (Table 1).

Hypertension was significantly more common in patients above 40 years old, p value (0.0001). Ischemic heart disease was significantly more frequent in patients above 40 years (p value = 0.001). Thirty-seven patients out of 38 patients (97.4%) with diabetes mellitus and AF were in the age group of 40 years and above, (Table 2).

One hundred and seventeen patients (61.25%) had valvular heart disease.

Seventy-three patients (38.2%) had mitral valve disease, 36 patients (18.8%)

had mitral regurgitation (MR), and 28 patients (14.7%) had mitral stenosis (MS),

Five patients (2.6%) had MS-MR, one patient (0.5%) had mitral valve prolapse (MVP) and three patients (1.6%) had MVP-MR, with a significant p value (p = 0.048) after condensing the echocardiographic findings into mitral valve disease was present or not.

Twenty-six patients (13.5%) had aortic valve disease; 23 patients (12%) had aortic regurgitation (AR), two patients (1%) had aortic stenosis (AS), and one patient (0.5%) had AS-AR with a significant p value (p = 0.043) after condensing the echocardiographic findings into aortic valve disease was present or not.

Eighteen patients (9.42%) had tricuspid heart disease; Seventeen patients (8.9%) had tricuspid regurgitation (TR), one patient (0.5%) had tricuspid stenosis (TS), (Table 3).

Twenty-two patients (11.5%) had dilated cardiomyopathy (DCM), three patients (1.6%) had restrictive cardiomyopathy (RCM), one patient (0.5%) had hypertrophic cardiomyopathy (HCM), and two patients (1%) had arrhythmogenic right ventricular cardiomyopathy (ARVC). The overall incidence of cardiomyopathy in the study population was 14.65%. There was no significant effect of age on the incidence of cardiomyopathy in patients with AF, (Table 4).

Three patients (1.6%) had hyperthyroidism, all of them above the age of 40.

**Table 1: Distribution of study sample according to initial and basic clinical characteristics.**

Variables			Age Group (year)			Total	P Value	
			< 40 N= 21 10.99%	40 - 65 N= 104 54.45%	> 65 N= 66 34.55%			
Sex								
•	Male	N %	14 66.7%	57 54.8%	27 40.9%	98 51.3%	0.069	
•	Female	N %	7 33.3%	47 45.2%	39 59.1%	93 48.7%		
Smoking Status								
•	Smoker	N %	5 23.8%	19 18.3%	4 6.1%	28 14.7%	0.041*	
•	Non-smoker	N %	16 76.2%	82 78.8%	61 92.4%	159 83.2%		
•	Ex-smoker	N %	0 0.0%	3 2.9%	1 1.5%	4 2.1%		
Positive History of Alcohol Drinking			N %	0 0.0%	4 3.8%	2 3.0%	6 3.1%	0.949
Obesity			N %	6 28.6%	30 28.8%	18 27.3%	54 28.3%	0.975
Positive Family History of AF			N %	2 9.5%	4 3.8%	3 4.5%	9 4.7%	0.532

\*after combining ex-smokers with non-smokers.

**Table 2: distribution of patients according to risk factors.**

Risk Factors		Age Group (year)			Total 191	P Value
		< 40 N = 21	40 - 65 N= 104	> 65 N= 66		
Hypertension	N	1	45	47	93	0.0001
	%	4.8%	43.3%	71.2%	48.7%	
History of IHD(Angina,MI)	N	1	20	25	46	0.001
	%	4.8%	19.2%	37.9%	24.1%	
Diabetic	N	1	21	16	38	0.149
	%	4.8%	20.2%	24.2%	19.9%	
Congenital heart disease	N	3	2	0	5	0.136 <sup>A</sup>
	%	14.3%	1.9%	0.0%	2.6%	
Pulmonary Disease: (Chronic Bronchitis, Asthma, Bronchiectasis, Fibrosing alveolitis)	N	0	5	5	10	0.328 <sup>B</sup>
	%	0.0%	4.9%	7.6%	5.2%	

<sup>A</sup> for age < 40year & age ≥40 year against presence or absence of congenital heart disease.<sup>B</sup> for age < 40year & age ≥40 year against with and without pulmonary disease.

**Table 3: Valvular heart disease in patients with AF.**

Valvular heart disease		Age Group (year)			Total N= 191	P Value
		< 40 N= 21	40 - 65 N= 104	> 65 N= 66		
<b>Mitral Valve Disease</b>						
	N	6	48	19	73	
	%	28.57%	46.15%	28.78%	38.21%	
• MVP	N	0	1	0	1	
	%	0.0%	1.0%	0.0%	0.5%	
• MS	N	4	22	2	28	
	%	19.0%	21.2%	3.0%	14.7%	
• MR	N	2	22	12	36	
	%	9.5%	21.2%	18.2%	18.8%	
• MS-MR	N	0	3	2	5	
	%	0.0%	2.9%	3.0%	2.6%	
• MVP-MR	N	0	0	3	3	
	%	0.0%	0.0%	4.5%	1.6%	
<b>Aortic Valve Disease</b>						
	N	2	16	8	26	
	%	9.52%	15.83%	12.12%	13.61%	
• AS	N	0	1	1	2	
	%	0.0%	1.0%	1.5%	1.0%	
• AR	N	2	14	7	23	
	%	9.5%	13.5%	10.6%	12.0%	
• AS-AR	N	0	1	0	1	
	%	0.0%	1.0%	0.0%	0.5%	
<b>Tricuspid Valve Disease</b>						
	N	4	11	3	18	
	%	19.04%	10.57%	4.54%	9.42%	
• TS	N	1	0	0	1	
	%	4.8%	0.0%	0.0%	0.5%	
• TR	N	3	11	3	17	
	%	14.3%	10.6%	4.5%	8.9%	

\*after condensing aortic valve disease into present and not.

\*\*after merging Tricuspid valve disease into present and not and age groups into up to 65 and older than 65.

**Table 4: Cardiomyopathy in patients with AF.**

Table 1: Cardiomyopathy in patients with AF						
Echo Findings		Age Group (year)			Total N= 191	P Value
		< 40 N= 21	40 - 65 N= 104	> 65 N= 66		
Cardiomyopathy						0.388*
	N	1	17	10	28	
	%	4.76%	16.34.7%	15.15%	14.65%	
•	DCM	N 0	15	7	22	
	%	0.0%	14.4%	10.6%	11.5%	
•	RCM	N 1	1	1	3	
	%	4.8%	1.0%	1.5%	1.6%	
•	HCM	N 0	0	1	1	
	%	0.0%	0.0%	1.5%	0.5%	
•	ARVC	N 0	1	1	2	
	%	0.0%	1.0%	1.5%	1.0%	

\*after condensing rows into none and positive findings.

## Discussion

In this study, the number of patients with atrial fibrillation was increasing by about two folds with each decade. This result was comparable with Framingham study in which AF doubles in prevalence with each decade of age<sup>(5)</sup>.

The number of men and women with AF was almost equal, but it was frequent in men below 65 years, while above 65 years it was more in women, this result was comparable with Friberg J et al study<sup>(6)</sup> and Piccini JP et al study<sup>(7)</sup>.

In the current study, we found that non-smokers significantly constituted the majority among each group of AF patients, this is because of other prevailing risk factors predisposing for AF in cohort of patients included in this study. In Atherosclerosis Risk in Communities (ARIC) study; the incidence of AF was 2.10 times greater than in those who never smoked and the associations are similar by gender; in addition, individuals who quit smoking exhibited a trend indicating a slightly lower risk of developing AF compared to those who continued to smoke<sup>(8)</sup>.

Only 3.1% of the study population gave a history of alcohol consumption which was much lower than that registered in Kodama S et al meta-analysis study<sup>(9)</sup>; the

explanation for this may be patients' denial of drinking alcohol because of religious embarrassment.

Twenty- eight point three percent of the study population were obese with a BMI > 30, and the age has no significant effect on the incidence of AF in obese patients. Wang TJ et al found in his study that there was an age-adjusted rate for AF increased across the three BMI categories in men and women<sup>(10)</sup>. In Danish, Diet, Cancer and Health study, Frost L et al found an increased risk of atrial fibrillation by an increasing body mass index in this large population-based cohort study<sup>(11)</sup>. Nine patients (4.7%) of this study population had a family history of AF, five of them had a positive history of familial cardiomyopathies, the results of this study was below the results in the European and north American registries due to shortage of diagnosing the molecular defect and specific chromosomal loci linked to familial AF<sup>(12)</sup>.

Hypertension and AF frequently coexist and their prevalence increases rapidly with aging, among the patients included in this study. Hypertension was present in 48.7% of cases; the majority of patients were above 40 years. Hypertension is still the main risk for the development of AF because of its high prevalence. Several pathophysiological mechanisms such as

(structural changes, neurohormonal activation, fibrosis, atherosclerosis ...etc.) have been advocated to explain the onset of atrial fibrillation<sup>(13)</sup>.

In this study, ischemic heart disease was the second most common association with AF; it is found in 24.1% of the patients, and all cases except one were above the age of 40 years. In Kravev S et al study the overall incidence of coronary artery disease (CAD) in patients presenting with AF was 34%; in patients >70 years, the incidence of CAD was 41%<sup>(14)</sup>.

In this study, 97.4% of patients with diabetes mellitus and AF were in the age group of 40 years and above, this explains that diabetes is associated with higher risk of developing AF and the risk was higher with longer duration of treated diabetes and worse glycemic control<sup>(15)</sup>.

Two point six percent of the study population had congenital heart disease which was less than that registered in Bouchardy et al study in which the incidence of congenital heart disease was 9%. The difference is probably due to the patients with congenital heart disease were shortly lived in Iraq because they had not undergone appropriate surgical treatment<sup>(16)</sup>.

In this study only 5.2% of the patients had pulmonary diseases which is less than that found in the Takahata study in which there was an increasing incidence of AF with increasing age and increasing severity of pulmonary function impairment<sup>(17)</sup>.

The probable explanation for our finding may be the younger age group and small sample size of patients included in this study.

In this study, we found that there was a significant effect of the age on mitral valve disease and aortic valve disease as risk factors for AF. They were more commonly found in patients more than 40 years old. Rheumatic heart disease (RHD) continues to be an important cause of atrial fibrillation in Iraq<sup>(18)</sup>.

In this study, we did not find a significant effect of age on the incidence of cardiomyopathy in patients with AF.

Only three patients (1.6%) with AF included in this study had hyperthyroidism and there is no significant effect of age on the incidence of hyperthyroidism as a risk factor for AF. This is probably because of the small sample of patients included in this study. In Frost L et al population based study of 40,628 patients with clinical hyperthyroidism, 8.3% had AF, and the AF occurred in 10-20% of patients over the age of 60 but is less than 1% of patients under the age of 40<sup>(19)</sup>.

In conclusion; the incidence of AF is age related and age has an important effect on certain risk factors. Optimal and timely management and primary prevention of reversible risk factors of AF are pivotal to contain AF epidemic.

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