

# Age is the dominant risk factor for atrial fibrillation; Etiology comparative study

*La edad es el factor de riesgo dominante de fibrilación auricular; estudio comparativo de etiología*

 Maher Ali Jasim<sup>1</sup>,  Sami M. Mishlish<sup>2</sup>,  Hazim Ismael Ghazzay<sup>3</sup>

<sup>1</sup>M.B.Ch. B, F.I.C.M.S, Consultant in Internal Medicine, Head of Medicine Department, College of Medicine, University of Anbar- Iraq. [mahirtalah@uoanbar.edu.iq](mailto:mahirtalah@uoanbar.edu.iq)

<sup>2</sup>M. B. Ch. B, F.I.C.M.S, Interventional cardiologist, lecturer in Department of Medicine, University of Anbar, College of Medicine/Iraq. [ssamimm@uoanbar.edu.iq](mailto:ssamimm@uoanbar.edu.iq)

<sup>3</sup>M. B. Ch. B, F.I.C.M.S, Physician in Internal Medicine, lecturer in Department of Medicine, College of Medicine, University of Anbar-Iraq. [drhazimghazzay@uoanbar.edu.iq](mailto:drhazimghazzay@uoanbar.edu.iq)

Corresponding author: Maher Ali Jasim: [mahirtalah@uoanbar.edu.iq](mailto:mahirtalah@uoanbar.edu.iq)

Received/Recibido: 04/21/2021 Accepted/Aceptado: 05/15/2021 Published/Publicado: 06/10/2021 DOI: <http://doi.org/10.5281/zenodo.5651176>

## Abstract

**A**trial fibrillation is the most common arrhythmia in elderly persons and a potent risk factor for stroke. It is characterized by a steeply increasing prevalence with advancing age.

**Objective-** The aims of this study were to investigate the prevalence of atrial fibrillation (AF) and its risk factors in compare with advancing age.

**Research design and methods-** A cross-sectional study was carried out on one hundred eleven patients were diagnosed with atrial fibrillation admitted in the internal medical department and coronary care unit in Al-Ramadi Teaching Hospital in the period from 1st of May to 1st of August 2019. All participants answered questionnaires for history of medical illness (hypertension, diabetes mellitus (DM), cardiovascular disease, chronic chest infection, hyperthyroidism, smoking and alcohol intake and full physical examinations that included particularly blood pressure measurement and cardiovascular examination. Investigations including ECG, echocardiography and fasting glucose and HbA1c. Patients are arranged in four age groups. The presences of known risk factors were record-

ed. Correlation was examined between the number of patients suffering from AF in each age group in men and women and risk factors. A p value < 0.05 were considered statistically significant.

**Results-** In a total of one hundred eleven patients with atrial fibrillation 60 patients (54%) were men & 51 (46%) were women. Their mean age was 60.3 years with SD± 14.1. The study revealed that the numbers of AF patients were steeply increased in parallel with advancing age and that the numbers of men were more than women There was a positive correlation between prevalence of AF patients and numbers of AF risk factors. Advancing age, hypertension, heart failure and ischemic heart disease were the most common risk factors affecting the prevalence of AF.

**Conclusions-** Advancing age and non-valvular heart diseases are the most common risk factors. The prevalence of atrial fibrillation is more common among men than women.

**Keywords:** atrial fibrillation, advancing age, risk factors.

## Resumen

**L**a fibrilación auricular es la arritmia más común en las personas mayores y un potente factor de riesgo de accidente cerebrovascular. Se caracteriza por una prevalencia cada vez mayor con la edad.

**OBJETIVO-** Los objetivos de este estudio fueron investigar la prevalencia de fibrilación auricular (FA) y sus factores de riesgo en comparación con la edad avanzada.

**DISEÑO Y MÉTODOS DE LA INVESTIGACIÓN-** Se realizó un estudio transversal en ciento once pacientes diagnosticados de fibrilación auricular ingresados en el servicio médico interno y unidad coronaria del Hospital Universitario Al-Ramadi en el período del 1 de mayo al 1 de agosto. 2019. Todos los participantes respondieron cuestionarios sobre antecedentes de enfermedades médicas (hipertensión, diabetes mellitus (DM), enfermedad cardiovascular,

infección crónica del pecho, hipertiroidismo, tabaquismo y consumo de alcohol y exámenes físicos completos que incluyeron particularmente la medición de la presión arterial y el examen cardiovascular. Investigaciones que incluyen ECG, ecocardiografía y glucemia en ayunas y HbA1c. Los pacientes están distribuidos en cuatro grupos de edad. Se registró la presencia de factores de riesgo conocidos. Se examinó la correlación entre el número de pacientes que padecen FA en cada grupo de edad en hombres y mujeres y los factores de riesgo. A  $p < 0,05$  se consideró estadísticamente significativo.

**RESULTADOS-** En un total de ciento once pacientes con fibrilación auricular, 60 pacientes (54%) eran hombres y 51 (46%) mujeres. Su edad media fue de 60,3 años con  $DE \pm 14,1$ . El estudio reveló que el número de pacientes con FA aumentó considerablemente en paralelo con el avance de la edad, y que el número de hombres era más que de mujeres. Hubo una correlación positiva entre la prevalencia de pacientes con FA y el número de factores de riesgo de FA. La edad avanzada, la hipertensión, la insuficiencia cardíaca y la cardiopatía isquémica fueron los factores de riesgo más comunes que afectaron la prevalencia de FA.

**CONCLUSIONES-** La edad avanzada y las cardiopatías no valvulares son los factores de riesgo más comunes. La prevalencia de la fibrilación auricular es más común entre los hombres que entre las mujeres.

Palabras clave: fibrilación auricular, edad avanzada, factores de riesgo.

## Introduction

# A

Atrial fibrillation (AF) is the predominant type of sustained cardiac arrhythmia affecting 1–2% in the general population and has been associated with significant morbidity, especially stroke and heart failure, as well as increased mortality and a reduction in quality of life<sup>1,2</sup>.

Moreover, due to increases in life expectancy in developed countries, with increases in the prevalence of cardiovascular disease, several studies suggest rising prevalence of AF and its overall global burden in the next 30 years<sup>3</sup>.

Atrial fibrillation now is affecting up to 3 % of the Western populations with the age of 20 years and older. And as predicted, according to the latest studies, the affected cases would rise to about 16 million in the USA and 30 million in the European Union by the beginning of 2050<sup>4,5</sup>.

Additionally, what makes it important to have an accurate population screening, is the undeniably huge number of patients who have been diagnosed of AF during routine clinical exams<sup>6,7</sup>.

In addition to age, there are other factors that affects the development of AF, including central obesity, male gender,

thyroid disease, some cardiovascular diseases such as previous heart failure and hypertension<sup>8</sup>.

The latest results of popular screening for AF states that its predominance varies amongst populations, as the data collected from England and Wales shows 0.4% of woman and 0.7% of men affected are aged 45-54, and these estimations obviously rise to about 7% of woman and 9% of men by age 75-84<sup>9</sup>.

While in America, 1.6-2.6% of adults are labeled to have a variety of 0.5% in people aged 40 years and younger to 5% in people aged 65 years and older and about 10% of people aged 80 years and older<sup>10-12</sup>.

This study was carried out to assess the prevalence of AF versus advancing age and the presence of risk factors among them in Al-Anbar Province, west of Iraq.

## Methods

# T

his study encompasses 111 patients who were diagnosed with atrial fibrillation (AF) and admitted to the Coronary Care Unit (CCU) and medical ward at Al-Ramadi Teaching Hospital during the period from the 1<sup>st</sup> of May 2019 till the 1<sup>st</sup> of August 2019. Sixty (54%) were men 51 (46%) were women included in this study.

Patients were divided in four age groups and each group was subdivided into males and females where the range of first group was 20-34, the second one was 35-49, the third group 50-64 and finally the fourth group was more than 64 years as mentioned in table 2.

Data were collected from all participants on the following socio-demographic indicators and health variables through hospital interviews:

Age, gender, residence and self-reported: Hypertension, hyperlipidemia, diabetes, pre-existing coronary heart disease or other cardiovascular disease, chronic chest infection, hyperthyroidism, current smoking and current alcohol intake).

Full physical examinations that included particularly blood pressure measurement, cardiovascular examination and respiratory examination.

The medical ethics committee of Al-Anbar Medical College, approved the study, and all participants gave written informed consent to participate in the study and was carried out in agreement with the Declaration of Helsinki.

The diagnosis of hypertension in hospital was defined as the use of antihypertensive drugs or elevated blood pressure values, with mean blood pressure (calculated from

at least 2 measurements done on at least 2 separate days of hospital stay)  $\geq 140$  mmHg systolic and/or 90 mm Hg diastolic. Blood pressure (BP) measurements were performed by trained medical personnel using (MDF instrument sphygmomanometer CE 0197) Hypertension was defined as systolic blood pressure  $\geq 140$  mmHg, diastolic blood pressure  $\geq 90$  mmHg, or any use of antihypertensive medications<sup>13</sup>.

HF was diagnosed based on typical history and physical examination findings along with echocardiographic evidence of myocardial dysfunction. Left ventricular ejection fraction (LVEF) was evaluated by echocardiography using the Simpson method or visually.

IHD was diagnosed based on typical history and/or previous acute coronary syndrome. Valvular disease and cardiomyopathy was diagnosed by echocardiography. Hypercholesterolemia was defined as total cholesterol level above 190 mg/dL and low-density lipoprotein (LDL) cholesterol level above 115 mg/dL or previously initiated lipid-lowering treatment. The diagnosis of thyroid disease was based on history or ascertained by abnormal thyroid function test (TSH, T3 and T4).

Diabetes was defined as fasting serum glucose level above 125 mg/dL on 2 separate occasions, serum glucose level above 199 mg/dL in a random sample with clinical symptoms of diabetes or at 2 h of the oral glucose tolerance test, HbA1c above 6.5% or self-reported diabetes (taking insulin and/or an oral hypoglycemic agent at the current examination<sup>14</sup>.

Alcohol intake was ascertained by self-report and categorized as the weekly alcohol consumption  $>90$  g ethanol. Smoking was ascertained by self-report. Chest infection was diagnosed by clinical features, and chest x-ray findings.

AF is diagnosed on the basis of a history of AF diagnosed by a physician and/or evidence of AF on the 12-lead resting ECG performed during the study, which lasts for 10 seconds. For this evaluation, all ECGs were interpreted by cardiologists, The 12-lead resting ECG was done by (Bio-net CardioCare 2000 quick guide made in Japan).

AF diagnosed on the basis of surface ECG is defined as absolutely irregular R peak intervals and an absence of P waves with a clear beginning and end<sup>15</sup>.

### Statistical Analysis

Statistical analysis was done by SPSS 18.0 (Statistical package for the social sciences, SPSS Inc, Chicago, IL, U.S.A.) for Windows. Continuous variables are presented as mean (SD), and categorical variables are reported as proportions. Correlation analysis for categorical variables was done by chi-square test and for continuous variables by Student's T-tests. A p value  $<0.05$  was considered statistically significant.

In this cross-sectional study a total of (111) patients suffering from atrial fibrillation (AF), sixty (54%) were men and 51 (46%) were women. The mean age group of males (61.8) was higher than that of women (58.7) as shown in table 1.

**Table (1): Distribution of sample according to age and their SD:**

Age	Range of age	Mean age	SD
All	22-87	60.3	14.1
Men	22-87	61.8	15
Women	23-80	58.7	13

The prevalence of AF were increased with advancing age as evident in table 2 were patient older than 64 lie a high rank in the list.

**Table 2: No. of AF patients among 4 age groups**

Range (year)	Male	Female	Total	% of total
20-34	5	4	9	8.2
35-49	6	9	15	13.5
50-64	21	21	42	37.8
> 64	28	17	45	40.5
Total	60	51	111	100

The chi square correlation test in table 3 showed statistically significant correlation ( $p < 0.005$ ) between the sex (male or female) and the age, i.e when the age was increased, the number of patients will increased also.

**Table 3 Distribution of risk factor according to age and gender.**

Age (Yrs)	1 risk factor		2 risk factors		3 risk factors		>3 risk factors		Total No	%
	M	W	M	W	M	W	M	W		
20-34	3	4	1	0	1	0	0	0	9	8.1
35-49	3	6	1	3	2	0	0	0	15	13.5
50-64	9	6	8	7	1	6	3	2	42	37.8
>64	9	3	7	2	6	6	6	6	45	40.5
Total	24	19	17	12	10	12	9	8	111	100%
	21.6%	17.1%	15.3	10.8%	9%	10.8%	8.1%	7.2%		

Chi-square  $\chi^2 = 18.71$

df=6 (degree of freedom)

p value= 0.005 significant

HT is the common risk factor followed by heart failure and ischemic heart disease. Pericarditis, thyroid disease, cardiomyopathy and interestingly valvular heart disease had the least prevalence among the studied group. Table 4

**Table 4: Overall Frequency & percentage of risk factors among 111 AF patients.**

Risk Factors	Frequency			Percentage (%)
	male	female	Total	
HT	39	27	57	51.4
HF	22	18	40	36.0
IHD	16	16	32	28.8
DM	19	10	29	26.1
Smokers	24	7	31	27.9
VHD	2	1	3	2.7
CMP	1	2	3	2.7
Pericarditis	1	0	1	0.9
Alcohol	4	0	4	3.6
Chest infection	7	7	14	12.6
Idiopathic	12	9	21	18.9
Thyroid disease	2	0	2	1.8
> one RF	34	32	66	59.5

The mean age of the studied patients was 60.3 years SD  $\pm$  14.1, this is more than that reported by Wafer A. Dabdoob et al which was 55.6 $\pm$ 15.3<sup>[3]</sup> and is less than that reported by (Luis Cea-Calvo et. al.) & (Alan S. Go, et al) <sup>[16,17]</sup>, which was 71.2 year SD ( $\pm$  12.2), probably because of presence of risk factors associated with bad medical care in the community.

The study showed that 60 patients (54%) were males and 51 (46%) were females, this differs slightly from that reported by (Alan S. Go, et al) <sup>[17]</sup>, in which 56.7% male and 43.4% female and is in keeping with the data from the Framingham study which revealed that men had 1.5-fold risk of developing AF than women.<sup>[18]</sup>

Regarding age groups distribution in the present study 21.7% of patients were younger than 50 years while in (Alan S. Go, et al)<sup>17</sup> only 10% are younger than 55 years, probably this is related to higher prevalence of myocardial diseases in our society.

In concern with the age; the incidence of AF increase with increasing age & highest percent (40.5%) was in those who are older than 64 years, this is in agreement with (Alan S. Go, et al) study which reported that 1.85 million (82%) of United States adults with AF are 65 years or older<sup>17</sup>

The current study showed that 43 patients (38.7%) were having one risk factor, 29 patients (26.2%) having two risk factors, while 22 patients (19.8%) having 3 risk factors, 17 patients (15.3%) having more than 3 risk factors.

Regarding the difference between male and female within the same age group. There was a significant statistical difference between number of AF patients suffering from hypertension, cardiomyopathy, chest infection, patients with >3 risk factors & advancing age, P value < 0.05, table 3, table 4.

This study showed that the prevalence of valvular heart disease was low (2.7%) compared to higher percentage of case of ischemic heart disease (28.8%) and congestive heart failure (36%). This is in contrast with Alan S. Go et al<sup>17</sup>. The higher incidence of ischemic heart disease among patients with atrial fibrillation can be attributed to stress of life, late detection and bad management of hypertension diabetes and coronary heart disease.

As shown in table 4 which revealed overall frequency and percentage of risk factors among studied patients we found that: hypertension 66 (51.4%), heart failure 40 (36%), ischemic heart disease 32 (28.8%), smoking 31 (27.9%), diabetes mellitus 29 (26.1%), idiopathic 21 (18.9%), chest infection 14 (12.6%), alcohol 4 (3.6%), cardiomyopathy 3 (2.7%), valvular heart disease 3 (2.7%), thyroid disease 2 (1.8%) where appear that hypertension, heart failure and ischemic heart disease are the most common risk factors.

Alan S. Go, MD, et al, found that adults with diagnosed atrial fibrillation have; known valvular heart disease 4.9%, previous ischemic stroke 8.9%, diagnosed heart failure 29.2%, Hypertension 49.3%, diabetes mellitus 17.1%, previous coronary heart disease 34.6%, angina 21.8%, and myocardial infarction 9.4%<sup>17</sup>.

Chinese study showed single cause/factor analysis: advanced age accounted for 58.1%, hypertension 40.1%, IHD 34.8%, HF 33.1%, rheumatic valvular disease 23.9%, idiopathic AF 7.4%, cardiomyopathy 5.4%, DM 4.1%, sick sinus syndrome 3.2%, hyperthyroidism 2.5%, and others 3.1%. Combined analysis showed that advanced age and hypertension are the most common, followed by IHD 19. This is partially in agreement with that reported by the current study.

In the current study a subset type of atrial fibrillation the idiopathic or lone atrial fibrillation comprise 18.9% of cases, this is in contrast with that of Richard L. Page, M.D study in which up to 45% of cases were belong to this type<sup>20</sup>.

Joon Hoon Jeong recorded that the most common risk factor of AF was cardiac disease & after adjusting for other associated factors, as well as age and sex, diabetes and hypertension remained significant predictors of AF<sup>21</sup>.

Framingham Heart Study suggested that (14%) of the AF risk in both men and women was attributable to hypertension<sup>22,23</sup>.

This study found that the prevalence of AF patients suffering more than one risk factor were 66 (59.5%) patients, among them 29 (26.2%), 22 (19.8%), and 17 (15.3%)



had, 2 risk factor, 3 risk factor, and > than 3 risk factors respectively.

This discrepancy between this study and that reported numbers mentioned above is most likely due to the presence of more than one risk factors, and/or to the severity of diseases in these patients, to the small number of my study or to the difference in the nature of study design.

AF was found to be directly proportional with aging. In which, males aged 75-79 have double the domination rate when compared to those aged 65-69, and even more than 5 times compared to those aged 55-59.

Even though we still haven't accurately identified the exact causes for these trends, we do think that it is partially explained by the global population's aging trends. Another theory explaining the rising rate of AF, is that it's majorly resulted due to vascular diseases caused by elevated blood pressure, atherosclerosis, and other cardiac risk factors which in return cause stiffness of arteries which results in impaired diastolic function and atrial hypertrophy and volume overload which finally leads to AF.

### Study limitations

This study did not include a population screening, we only focused on patients who were already admitted to coronary care unit and so many patients with asymptomatic AF were unfortunately missed.

## Conclusions

**A**lthough there are many risk factors for AF, like, valvular heart diseases, hypertension, congestive heart failure, thyroid disease, diabetes mellitus and others, advanced age is the main risk factor that promotes the development of AF, and because AF is usually asymptomatic and considered the main risk factor for stroke, it is highly important to perform population screening to detect AF in old-aged patients, especially those who already have other risk factors, for early treatment which decreases the risk of thromboembolic events.

Disclosure: Authors have no conflict of interest.

Funding: The authors did not receive any fund.

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