Cardiovascular high-risk profile of patients with atrial fibrillation and chronic kidney disease

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Abstract

Introduction: Atrial fibrillation (AF) is the most common cardiac arrhythmia encountered in clinical practice, associated with high morbidity and mortality linked to stroke and heart failure. Chronic kidney disease (CKD) remains an often underdiagnosed condition, but its association with AF considerably worsens the cardiovascular prognosis.

Objective: To determine the epidemiological and clinical profile of patients being managed for AF.

Materials and methods: A prospective study included patients seen in outpatient clinics or admitted to hospital for AF. Renal function was assessed using the glomerular filtration rate (GFR) to identify the presence of CKD. Demographic characteristics, the clinical presentation of AF and associated comorbidities were analysed.

Results: The mean age was 62.5 ± 14.4 years. Chronic kidney disease (CKD) was significantly more common in patients aged over 70 years, with a predominance of female patients. Clinically, the majority of patients with kidney failure had permanent AF. The comorbidity profile was severe, characterised by a high prevalence of hypertension, diabetes and heart failure.

Conclusion: The association between AF and CKD is associated with poor outcomes. Routine renal screening is vital for reducing morbidity and mortality.

Keywords: Atrial fibrillation; Chronic kidney disease; Epidemiology; Comorbidities; Cardiovascular prognosis.

Introduction and current state of knowledge

1. Atrial fibrillation

Atrial fibrillation (AF) is the most common cardiac arrhythmia in adults. Its prevalence doubles every decade after the age of 50, reaching up to 10 per cent in those over 80 in some studies [1,2]. In France, more than 650,000 people are affected, with around two-thirds aged 75 or over [3]. The ELREGFA study showed that 190,000 people had AF in Algeria in 2017 [4]. The prevalence is underestimated due to the number of silent or asymptomatic cases of AF [5]. There has been an increase in comorbidities associated with AF: 20–30 per cent of strokes are caused by AF; the incidence of heart failure has risen by 42 per cent; and the detrimental effects on quality of life (QoL) have drawn clinicians' attention to this condition. Finally, one third of hospital admissions due to arrhythmias are caused by AF [6,7]. Its prevalence increases with age, obesity, high blood pressure, diabetes, sleep apnoea and cardiovascular disease [8].

2. Chronic kidney disease

Chronic kidney disease (CKD) is defined by KADIGO as a sustained decline in glomerular filtration rate (GFR) to < 60 mL/min/1.73 m² for more than 3 months, or markers of kidney damage (albuminuria, urinary or structural abnormalities), with five stages of progressive severity (see Table 1). It is a silent and progressive disease. Between 8 and 16 per cent of adults worldwide live with CKD. [9]. In Algeria, 1.5 million Algerians were in a chronic kidney disease (CKD) in 2016 (2016 Maghreb Nephrology Congress): 3,900 with end-stage CKD, of whom 91 per cent were on haemodialysis, 3 per cent on peritoneal dialysis and 6 per cent had received a kidney transplant.

Table 1 : Stades d'insuffisance rénale selon la KADIGO (Kidney Disease: Improving Global Outcomes)

Stages	eGFR / DFG (mL/min/1.73 m²)	Summary of Description
Stages 1 & 2 (Early)	**60 or higher**	Normal or mildly reduced kidney function, but tests show signs of damage (e.g., protein in urine). No symptoms.
Stage 3 (Moderate)	**30 to 59**	Moderate loss of kidney function. Waste products begin to build up, and mild symptoms (fatigue, fluid retention) may appear.
Stage 4 (Severe)	**15 to 29**	Severe drop in kidney function. Medical focus shifts to actively planning for kidney failure treatments.
Stage 5 (Failure)	**Less than 15**	Complete kidney failure. Dialysis or a kidney transplant is required to sustain life.

3. Physiopathology

There is a bidirectional vicious circle: chronic kidney disease (CKD) leads to chronic inflammation, volume overload, myocardial fibrosis and atrial hypertrophy, which in turn trigger atrial fibrillation (AF). Conversely, AF results in reduced cardiac output, loss of atrial systole and renal micro-embolisms. Patients with both AF and chronic kidney disease (CKD) are at significant risk of both thromboembolism (stroke) and haemorrhage [10].

Cardiovascular high-risk profile of patients with atrial fibrillation and chronic kidney disease [11]

Background

The co-occurrence of atrial fibrillation (AF) and chronic kidney disease (CKD) is a major public health issue that has been little studied, particularly in individuals with multiple cardiovascular risk factors. The combined effect of deteriorating renal function promotes the development of AF, whilst AF accelerates renal decline and significantly increases the risk of stroke and haemorrhagic events. It constitutes a major public health problem.

Objective: To determine the epidemiological and clinical profile of patients being treated for AF.

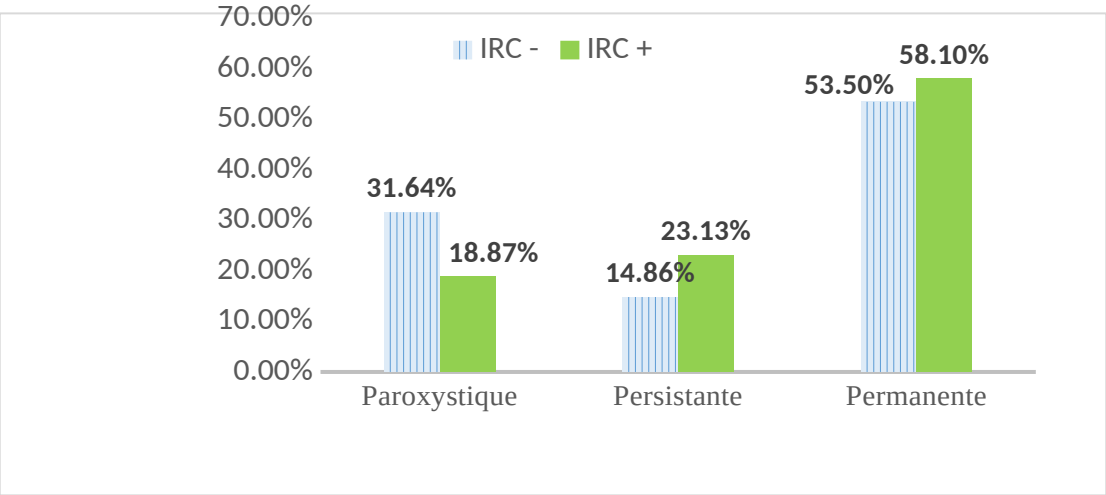
Materials and methods

Our study was a prospective, cross-sectional, descriptive study conducted in the cardiology department of the Béni-Messous University Hospital in central Algiers from June 2013 to August 2015 (26 months) among adult patients with known AF or AF diagnosed by a recent ECG or Holter ECG. Pregnant women, patients who had suffered a haemorrhagic stroke, and those with post-operative AF were excluded.

Results:

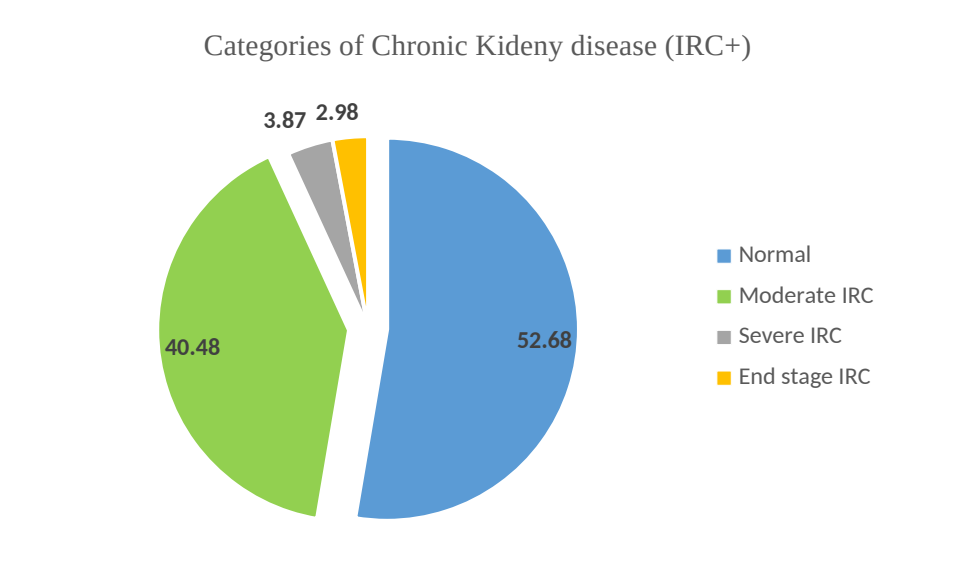
Of the 336 patients with AF, 149 had chronic kidney disease (CKD), representing 47.32 per cent of cases. The sex ratio in this population was 0.77, with 90 women (p = 0.028). The mean age was 62.5 ± 14.4 years. Among patients with AF and CRF, those aged 65 years and over accounted for 58 per cent of cases (p = 0.005), of whom 40 per cent were over 70 years of age.

Table 2 : Type de FA dans la population générale et dans la population en IRC



P= 0,019

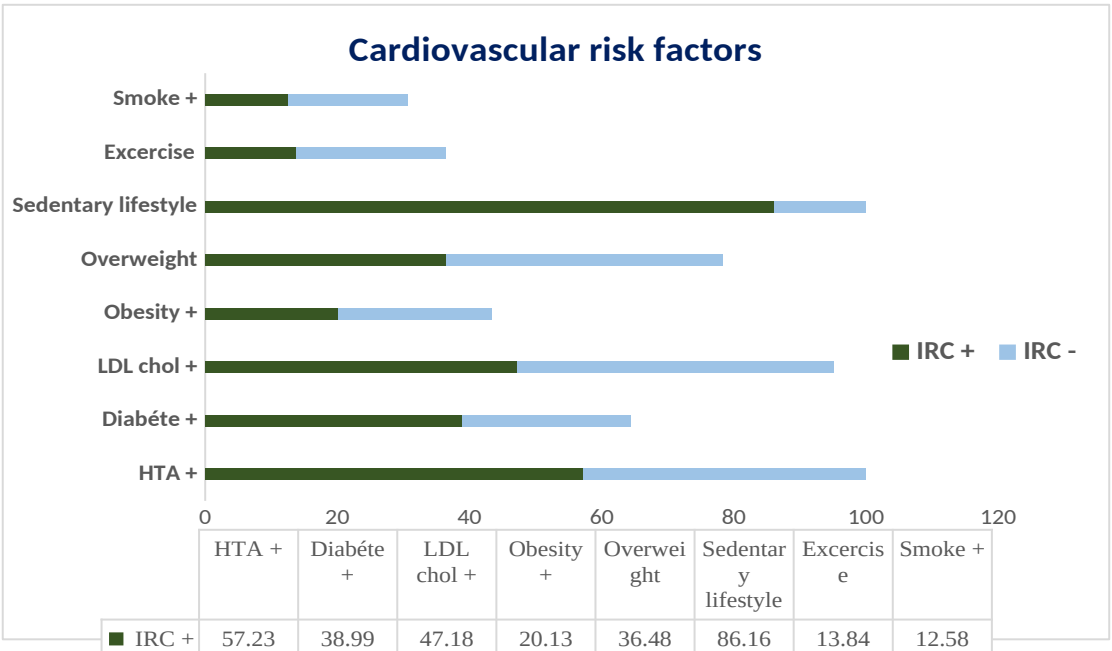
Circle 1 : Categories of chronic kidney disease



The proportion of patients with renal failure is 47.32 per cent of cases, or 149 patients: moderate in 40.48 per cent of cases, severe in 3.87 per cent and end-stage in 2.98 per

cent of cases. The mean GFR: 63.65 ml/min/1.73 m² ± 24.32; in men: 67.61 ml/min/1.73 m² ± 25.86 and in women: 59.72 ml/min/1.73 m² ± 22.07. Chronic kidney disease (CKD) is common in people aged 70 and over: it is severe to end-stage in 7 per cent of cases.

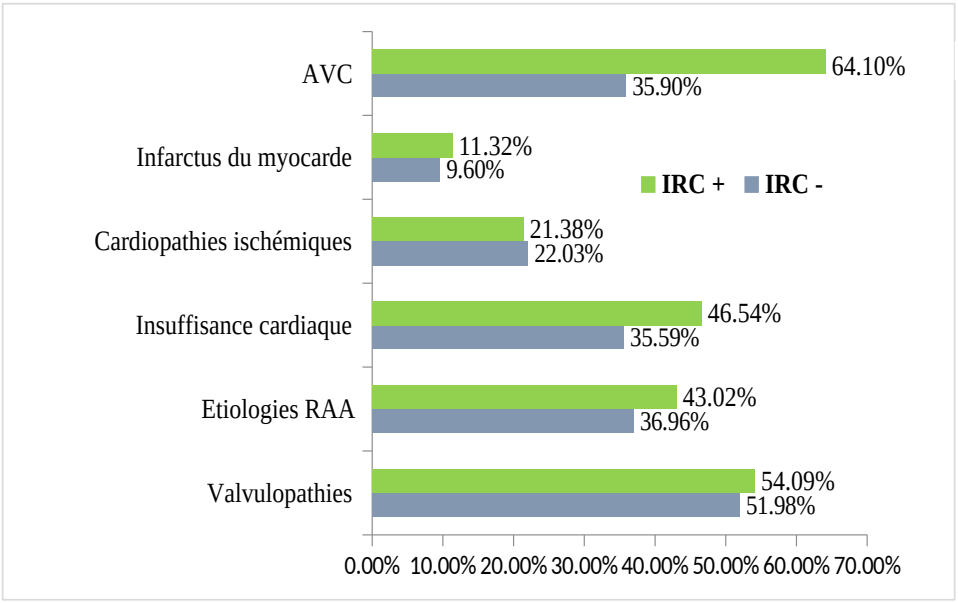
Table 3 : Cardiovascular risk factors



	HTA +	Diabéte +	LDL chol +	Obesity +	Overweight	Sedentary lifestyle	Excercise	Smoke +
IRC +	57.23	38.99	47.18	20.13	36.48	86.16	13.84	12.58
IRC -	42.77	25.42	47.89	23.16	41.81	13.84	22.6	18.08

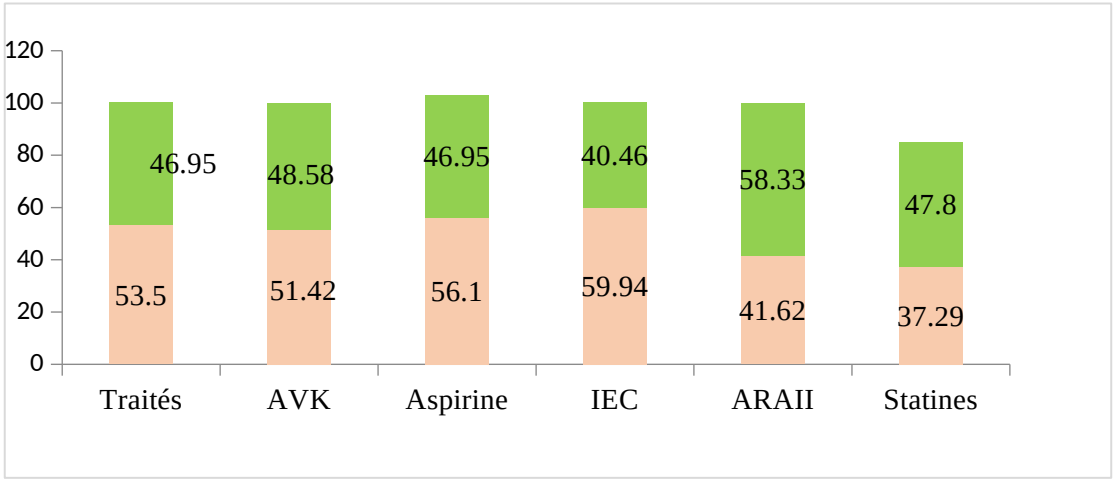
Type 2 diabetes: p = 0.04; overweight/obesity: p = 0.024; sedentary lifestyle: p = 0.001

Table 4 : Cardiac diseases and stroke



Heart failure : p= 0.041 ; Stroke = AVC : p= 0.024

Table 5 : Analysis of prescribed medicines



Discussion

In our series, permanent AF is more common than persistent and paroxysmal AF. Chronic kidney disease (CKD) is more common in cases of permanent AF. Little data are available on the prevalence of AF in patients with chronic kidney disease (CKD). In the REGARDS study, Baber et al found that the prevalence of AF increased significantly as the glomerular filtration rate (GFR) decreased. Among 2,683 patients with a GFR of 30–59 ml/min/1.73 m² and 215 patients with a GFR < 30 ml/min/1.73 m², the prevalence of AF was 2.7 per cent and 4.2 per cent, respectively [12].

The European Society of Cardiology (ESC 2020) guidelines state that chronic kidney disease (CKD) may be present in approximately 40–50 per cent of patients with AF. Our finding of 47.32 per cent therefore falls within this range and is consistent with international data. The same guidelines indicate that AF is also common in patients with CKD, illustrating the close relationship between these two conditions [13].

The profile of our population is characterised by:

A younger age compared with that in Western studies: 58 per cent of patients are aged 65 and over ($p = 0.005$), in whom CKD is most often moderate; 40 per cent of patients are aged 70 and over. Advanced-stage CKD predominates in the latter group and accounts for only 7 per cent of cases.

Atrial fibrillation (AF) and a reduction in glomerular filtration rate (GFR) are strongly correlated with advanced age, according to a study conducted by Iguchi et al. The estimated overall prevalence of AF was 1.6 per cent ($p < 0.001$) [14]. Ageing simultaneously promotes a decline in GFR, arterial stiffness, myocardial fibrosis and structural changes in the atria. It thus contributes to the co-occurrence of chronic kidney disease (CKD) and AF. In the CRIC cohort: a 27 per cent increase in age was associated with a 27 per cent increase in AF: a common ground of cardio-renal vulnerability [15].

A predominance of female patients ($p = 0.028$). This predominance may be linked to the demographic structure of the study population, the age of the patients recruited, or the characteristics of hospital recruitment. In our series, valvular disease of rheumatic aetiology is predominant among women recruited either for assessment of underlying valvular disease or hospitalised for heart failure. However, this does not allow us to conclude that women are inherently more at risk of the AF–CKD association.

In the CRIC cohort, which comprised patients with chronic kidney disease (CKD), female sex was associated with lower odds of developing AF than male sex after adjustment (OR = 0.80; 95% CI: 0.65–0.98). [15].

A high prevalence of cardiovascular risk factors, notably age, hypertension, diabetes mellitus, hypercholesterolaemia, as well as being overweight and a sedentary lifestyle.

Hypertension is the most common risk factor in our population (57 per cent). This finding is consistent with the literature, which highlights the major role of hypertension in the development of atrial fibrillation and chronic kidney disease. It contributes to hypertensive nephropathy, left ventricular hypertrophy and atrial remodelling.

Diabetes, present in 38 per cent of our patients, is also a significant risk factor. It contributes to diabetic kidney disease, vascular damage and structural changes in the myocardium. International guidelines recognise that hypertension and diabetes are risk factors common to both conditions.

These risk factors are becoming increasingly prevalent in our country, as has already been demonstrated by the Algerian TAHINA study conducted by the INSP [16]. This epidemiological transition has contributed to the rise in hypercholesterolaemia and ischaemic heart disease. Hypercholesterolaemia, being overweight and obesity also indicate a significant metabolic burden amongst our patients.

Finally, a sedentary lifestyle, observed in 86 per cent of patients, is a particularly prominent feature of our cohort. It may contribute to overweight, hypertension and metabolic imbalance. However, this high prevalence must be interpreted whilst taking into account age and any functional limitations.

Compared with the literature, our population is therefore characterised by a significant accumulation of cardiovascular risk factors, which may contribute to the co-occurrence of CKD and AF. However, a precise quantitative comparison with other cohorts would require data on their respective frequencies and comparable recruitment criteria.

A high burden of cardiovascular and cerebrovascular morbidity—particularly heart failure and strokes—is a key finding, with significant differences observed for both.

The 2024 European guidelines reiterate that AF is a major risk factor for thromboembolic events and that, without appropriate prevention, it increases the risk of ischaemic stroke approximately fivefold. They also emphasise that the risk of thromboembolism exists regardless of the form of AF—paroxysmal, persistent or permanent [17].

Chronic kidney disease (CKD) exacerbates this problem. The 2023 US guidelines identify chronic kidney disease as an independent risk factor for stroke in patients with AF. It is also associated with an increased risk of haemorrhage, which makes thromboembolic prevention more complex [18].

The high incidence of strokes reported in our series could therefore be explained by the association between AF, chronic kidney disease, advanced age and vascular risk factors. Nevertheless, a rate of 64 per cent would be particularly high compared with data in the literature, probably due to the inclusion of patients on anticoagulant therapy for AF, undetected TIA in cases of silent AF, and a history of stroke across the entire cohort.

Heart failure, present in 46 per cent of patients, also illustrates the complexity of this association. AF can impair ventricular filling and cause heart rate-related cardiomyopathy, whilst heart failure promotes atrial dilatation and the persistence of

AF. Chronic kidney disease (CKD) can further exacerbate this vicious circle through fluid and sodium retention, hypertension and metabolic disturbances.

A significant association was found with renal impairment (p = 0.025). This finding is consistent with international data showing an increased risk of stroke in patients with CKD and AF. Similarly, heart failure, found in 46 per cent of our patients, is associated with chronic kidney disease (p = 0.041). Studies from the CRIC cohort confirm the significance of the interaction between atrial fibrillation, heart failure and chronic kidney disease.

Finally, myocardial infarction, reported in 11 per cent of patients, indicates the possible co-existence of coronary artery disease and global cardiorenal impairment.

Thus, in the GARFIELD registry, 11.7 per cent of patients with moderate to severe chronic kidney disease were identified amongst the 52,080 patients studied (risk score for mortality, stroke and bleeding), and this proportion increases with age and the presence of comorbidities[19].

In eligible patients, direct oral anticoagulants are generally preferred to vitamin K antagonists, with specific dose adjustments based on renal function in accordance with the 2024 ESC guidelines. In our series, VKAs (46 per cent) were the predominant form of anticoagulation due to the unavailability of DOACs at the time of patient recruitment and the prevalence of rheumatic valvular heart disease, as well as among patients with mechanical heart valves. However, it is noted that this proportion is insufficient given the indications for anticoagulation in our patients. Aspirin is not an alternative to anticoagulation for preventing strokes associated with AF. It is indicated here primarily for the prevention of coronary and vascular diseases.

ARA II (42 per cent): their use is consistent with the management of hypertension and certain forms of chronic kidney disease, depending on the clinical and laboratory profile. Statins (40 per cent) play a role in the prevention of atherosclerotic cardiovascular disease. In patients with chronic kidney disease (CKD), statins play an important role in cardiovascular prevention and are prescribed in 40 per cent of cases.

Conclusion:

The combination of atrial fibrillation and chronic kidney disease is associated with a significant cardiovascular burden (hypertension, diabetes, heart failure), highlighting the need for systematic renal screening and early multidisciplinary management to reduce morbidity and mortality.

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