

Atrial Fibrillation (AF) Associated with Arterial Hypertension in the Cardiology Department of the Gabriel Touré University Hospital Center (CHU-GT), Mali

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How to cite this paper: Traore, D., Sagara, I., Bâ, H.O., Toure, M., Keita, Z., Diarra, B., Doumbia, M.K., Dakouo, R.-M., Camara, H., Sogodogo, A., Traore, A., Sangare, I., Sidibe, N., Diarra, S. and Menta, I. (2025) Atrial Fibrillation (AF) Associated with Arterial Hypertension in the Cardiology Department of the Gabriel Touré University Hospital Center (CHU-GT), Mali. *World Journal of Cardiovascular Diseases*, **15**, 340-350.

<https://doi.org/10.4236/wjcd.2025.157029>

Received: June 11, 2025

Accepted: July 21, 2025

Published: July 24, 2025

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Abstract

Introduction: Hypertension and atrial fibrillation are both very common and closely intertwined. There is limited data on this association in our setting, which motivated the present study. **Objective:** The aim of this study was to investigate the epidemiological and clinical aspects of atrial fibrillation associated with arterial hypertension in a hospital setting. **Methods:** This was a cross-sectional and descriptive study conducted with retrospective recruitment in the cardiology department of the Gabriel Touré University Hospital Center over a period from January 2015 to December 2018, spanning four years. It involved the analysis of records of patients hospitalized in the department. **Results:** During the study period, 52 patients were diagnosed with atrial fibrillation, of which 34 were hypertensive, yielding a proportion of AF associated with hypertension of 65.40%. Atrial fibrillation accounted for 4.39% of hospital admissions. The mean age of the patients was 66 years, with a standard deviation of 12 years, ranging from 30 to 87 years. The sample consisted of 25 women (74%) and 9 men (26%). More than half of the patients (58.82%) presented with elevated blood pressure at the time of admission. Heart failure (44.11%) with clinical signs of decompensation was the predominant finding at the time of discovery. Atrial fibrillation was associated with left ventricular hypertrophy in 14.71% of cases as seen in electrocardiograms. Among the 20 patients with elevated blood

pressure, 85% had received antihypertensive therapy (monotherapy 82.35%). Forty-seven percent (47%) of patients had received slowing treatment with digoxin (41%) and beta blockers (18%). Only 44% of patients at high risk of thromboembolism were receiving oral anticoagulant therapy with a vitamin K antagonist. **Conclusion:** The association between atrial fibrillation and arterial hypertension is prevalent in our practice, particularly among women and the elderly. The clinical presentation was characterized by cardiac decompensation and elevated blood pressure. The majority of patients with poorly controlled hypertension were on antihypertensive monotherapy. Renin-angiotensin system blockers were the most commonly prescribed. Anticoagulant and anticoagulant therapy was initiated in less than half of our sample, despite the high risk of thromboembolism and high mean heart rate.

Keywords

Atrial Fibrillation, Hypertension, Hospitalization, Cardiology, Mali

1. Introduction

Atrial fibrillation (AF) is the most common supraventricular cardiac rhythm disorder, characterized by the loss of organized atrial electrical activity leading to rapid, chaotic depolarizations (400 to 600 per minute), resulting in the loss of atrial contraction and an increased ventricular rate [1] [2]. The prevalence and incidence of AF are continually rising. A projected study suggests an exponential increase in the prevalence of AF, potentially reaching 5.6 million cases in the United States by 2050 [3]. Several factors contribute to this rise, including age, which is closely linked to AF and hypertension; hypertension, which causes left ventricular remodeling and left atrial dilation; as well as other risk factors such as obesity, diabetes, smoking, alcohol consumption, and prolonged PR interval indicative of increased pulse pressure [4].

Atrial fibrillation frequently coexists with various heart conditions. The primary associated pathologies include hypertension, coronary artery disease, valvular heart disease, dilated cardiomyopathy, and sinus node dysfunction [5]. The Framingham study corroborates these findings, identifying similar comorbidities, including arterial hypertension, cardiac decompensation, and valvopathies [6] [7].

Poorly controlled hypertension can lead to diastolic dysfunction, which may progress to atrial fibrillation, heart failure with preserved ejection fraction, and eventually systolic dysfunction. In many surveys and studies, approximately 80% of hypertensive patients are found to have atrial fibrillation [8]. Furthermore, hypertension serves as a strong independent predictor of stroke in patients with AF [9] [10]. A large recent trial indicated that a history of hypertension was significantly associated with findings of left atrial stasis and thrombus on transesophageal echocardiography [11]. The strong relationship between hypertension and

stroke in patients with AF necessitates further clarification.

In Mali, limited data exist regarding the association between atrial fibrillation and arterial hypertension, thus motivating the initiative to explore the epidemiological and clinical aspects of atrial fibrillation in hospitalized hypertensive patients.

2. Methodology

This was a cross-sectional and descriptive study with retrospective recruitment that took place in the cardiology department of CHU Gabriel TOURE over a 4-year period from 01 January 2015 to 31 December 2018. It focused on the records of patients hospitalised in the aforementioned department.

Inpatients of both sexes with hypertension and electrocardiographic AF were included. Patients with atrial fibrillation who were not hospitalised in the department during the study period were excluded.

We used an Access database to collect socio-epidemiological and clinical information, which was analysed using SPSS 20.0.

Operational definitions:

Diagnostic criteria for AF on electrocardiogram were absence of sinus P waves, polymorphic baseline tremor and irregular ventricular activation [1].

Hypertension is defined in the office on the basis of repeated values of SBP \geq 140 mm Hg and/or DBP \geq 90 mm Hg, according to the 2018 European guidelines and current international guidelines [11]-[13].

Tachycardia was defined as a heart rate greater than or equal to 100 beats/min.

It is recommended to classify the BP level as optimal, normal, high normal or grade 1 - 3 AH, depending on the BP value measured in the doctor's surgery [14] [15]:

| Category | SBP (mm Hg) | | DBP (mm Hg) |
|-----------------------|-------------|--------|-------------|
| BP optimal | <120 | and | <80 |
| BP normal | 120 - 129 | and/or | 80 - 84 |
| BP normal high | 130 - 139 | and/or | 85 - 89 |
| HBP grade I | 140 - 159 | and/or | 90 - 99 |
| HBP grade II | 160 - 179 | and/or | 100 - 109 |
| HBP grade III | \geq 180 | and/or | \geq 110 |
| HBP isolated systolic | \geq 140 | and | <90 |

The CHA2DS2-VA score was used to assess thromboembolic risk.

3. Results

From January 1, 2015, to December 31, 2018, 52 patients were hospitalized for atrial fibrillation, of which 34 were hypertensive, *i.e.* a frequency of AF associated with high blood pressure of 65.40%. It accounted for 4.39% of hospitalizations.

The mean age was 66 years, with a standard deviation of 12 years and extremes of 30 years and 87 years. The age group 60 - 74 years was the most represented, with 38.24% (Figure 1). Females predominated (74%), with a sex ratio (M/F) of

0.35. Fifteen patients, *i.e.* 44%, had other comorbidities such as smoking (26.47%), weight abnormality (14.71%) and diabetes (2.94%). Decompensated heart failure was the dominant circumstance of discovery (44.11%) (**Figure 2**). Dyspnea was the main symptom (58.82%), followed by cough (23.53%) and palpitations (23.53%) (**Figure 3**). Twenty (20) patients (58.83%) had high blood pressure on admission, of whom 29.41%, 17.65% and 11.77% were WHO grade I, II and III respectively (**Table 1**). The mean heart rate of our patients was 116 ± 23 beats/min, with extremes of 63 and 164 beats/min. Tachycardia was observed in 76.47% of patients and systolic murmur in 20.59% of patients. Crackles were present in 20.59%, followed by neurological deficits and ascites with hepato-jugular reflux, *i.e.* 11.76% each (11.76% each) (**Table 2**).

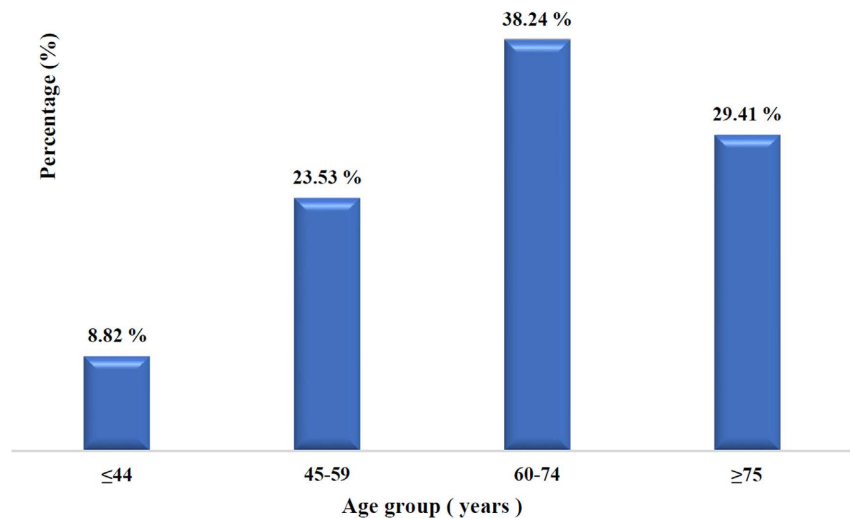


Figure 1. Distribution of patients according to age group.

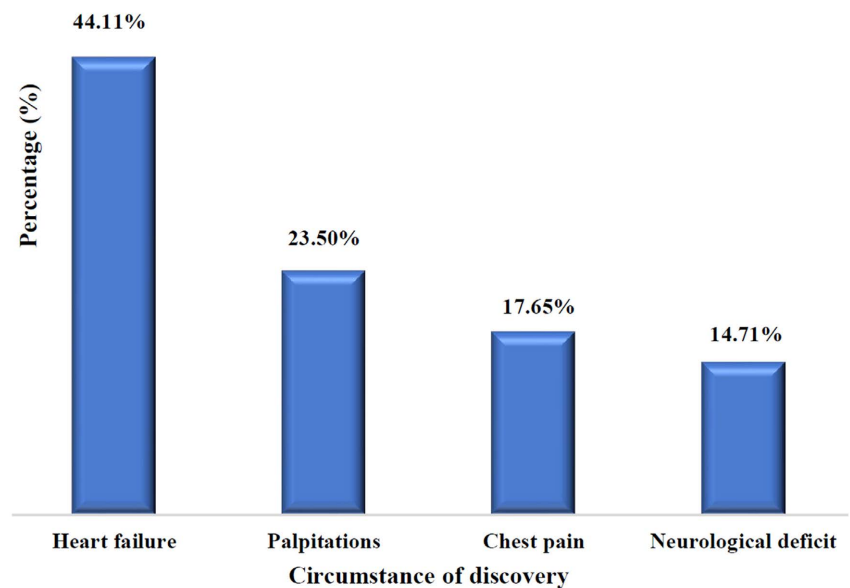


Figure 2. Distribution of patients according to the circumstance of discovery of atrial fibrillation.

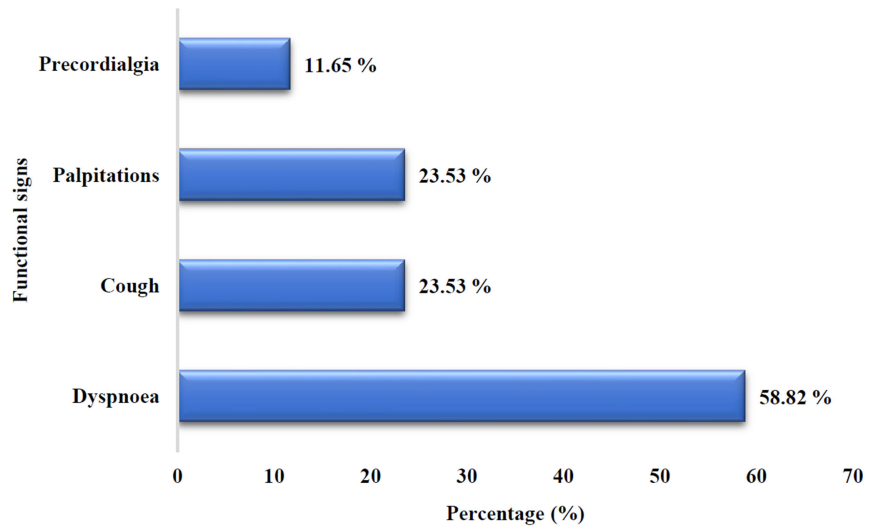


Figure 3. Distribution of patients according to functional signs.

Table 1. Distribution of patients according to BP value on admission.

| Blood pressure | Effective | Percentage |
|------------------|-----------|--------------|
| Optimal | 7 | 20.58 |
| Normal | 6 | 17.65 |
| Normal high | 1 | 2.94 |
| Grade I | 10 | 29.41 |
| Grade II | 6 | 17.65 |
| Grade III | 4 | 11.77 |
| Total | 34 | 100.00 |

} 58.83%

Table 2. Distribution of patients according to physical signs.

| Physical signs | | | Frequency (N) | Percentage (%) |
|-----------------------------|---------------|-------------------------|---------------|----------------|
| Cardiac auscultation | Heart rate | Tachycardia | 26 | 76.47 |
| | | Normal | 08 | 23.53 |
| | | Gallop | 03 | 8.82 |
| | | Derosier Triad | 01 | 2.94 |
| | | Ssystolic murmur | 07 | 20.59 |
| | Others | Crackling rales | | 07 |
| Neurological deficits | | | 04 | 11.76 |
| Hepatojugular reflux | | | 04 | 11.76 |
| Ascite | | | 04 | 11.76 |
| Hepatomegaly | | | 03 | 8.82 |

On electrocardiogram, left ventricular hypertrophy and ventricular extrasys-

toles were found in 14.71% and 11.76% of patients respectively. Associated electrocardiographic abnormalities were missing from the records in over 70% of patients (Table 3).

Table 3. Distribution of patients according to associated electrocardiographic abnormalities

| Associated electrocardiographic abnormalities | Effective (N) | Percentage (%) |
|---|---------------|----------------|
| LHV + FA | 5 | 14.71 |
| ESV + FA | 4 | 11.76 |
| Salves TV + FA | 1 | 2.94 |
| NS | 24 | 70.59 |
| Total | 34 | 100 |

NS: not specified; FA: Ventricular fibrillation; LHV: left ventricular hypertrophy.

On echocardiography, left atrium and left ventricular dilation were described in 35.29% and 38.24% of patients, respectively, with systolic dysfunction in 32.36%.

Of the 20 patients with elevated blood pressure, 85% were on antihypertensive therapy (monotherapy 82.35% and dual therapy 17.65%). Blockers of the renin angiotensin system (ACEI/ARB II) were the most commonly prescribed, accounting for 82%.

Of the 33 patients with non-valvular AF, 93% had a CHA₂DS₂-VA score ≥ 2 , 88% of whom were receiving anticoagulant treatment with low molecular weight heparin (85%) and vitamin K antagonists (44%). Slowing treatment was initiated in 47% of patients, with digoxin (41%) and beta-blockers (18%). No patient benefited from cardioversion.

4. Discussion

According to the Framingham study data, 14% of atrial fibrillations are attributable to arterial hypertension [5]. Several studies confirm the observation that hypertensive individuals have a higher risk of developing atrial fibrillation [16]-[18].

In 2022, a meta-analysis of cohort studies suggested that people with hypertension had a 50% higher relative risk of atrial fibrillation than people without hypertension. The relative risk of atrial fibrillation increases by 19% per 20 mm Hg increase in systolic blood pressure and by 6% per 10 mm Hg increase in diastolic blood pressure [19].

The frequency of theatrical fibrillation associated with hypertension in our study was 65.40%, close to that of the study AFFIRM, which found 71% [20]. Yassine R [21], Coulibaly S [22], Yomma D [6], and Levy S [4] reported a frequency of high blood pressure associated with atrial fibrillation of 55%, 51.42%, 46%, and 40%, respectively.

In our study, the average age was 66 years, with extremes of 30 and 87 years.

The 60 - 74 age group was the most represented at 38.24%. At the house of Coulibaly S [22], the average age was 55 years with extremes of 17 years and 95 years, and the modal class was the 61 - 70 age group, with about a quarter of the workforce.

Cardiac ageing is accompanied by structural changes at the level of the myocardium, which induce disorders of relaxation of the left ventricle, compensated by atrial systole but leading to dilation of the atrial mass and the appearance of fibrosis, favouring the occurrence of AF. At the same time, there is an increase in electrical activity at the level of the pulmonary veins.

Like Coulibaly S [22], the female gender predominated in our study with a frequency of 74%.

Other cardiovascular risk factors were represented by smoking (26.47%), weight abnormality (14.71%) and diabetes (2.94%). Yomma D [6] found the same cardiovascular risk factors: smoking (34%), obesity (45%) and diabetes (27%). Heart failure was the dominant circumstance of discovery (44.11%), and dyspnea was the main symptom (58.82%), followed by cough and palpitations with a frequency of 23.53% each. Coulibaly S [19] described heart failure with clinical signs of left or global decompensation in 77.14% of patients.

More than half of our patients had high blood pressure figures on admission, *i.e.* 58.82%. From the Framingham cohort, Lyod-Jones et al showed that life expectancy in patients with atrial fibrillation and high blood pressure was lower in the elderly compared to the young population [21].

On cardiac physical examination, tachycardia and systolic murmur were noted in 76.47% and 20.59% of patients, respectively. Yomma D [6] and Coulibaly S [22] described a heart murmur in 33% of patients and tachycardia in 79% of patients, respectively.

Hypercreatinine was found in 17.65% of patients. However, Coulibaly S [22] reported 23.80% of cases of hypercreatinine. Left ventricular hypertrophy on ECG was found in 14.71% of patients. Niankara A [23] reported left ventricular hypertrophy in 50% of patients.

The HVG is the most powerful predictor of AF: it increases LV stiffness, parietal stress and filling pressures, decreases coronary reserve, and increases activation of the sympathetic nervous system and the renin angiotensin aldosterone system (RAAS), which are associated with the onset of AF [24].

Dilation of the left atrium was described in 35.29% of patients, and that of the left ventricle in 38.24%, with systolic dysfunction in 32.36%. Coulibaly S [22] and Yomma D [6] noted dilation of the left atrium in 80% and 54% of patients, respectively. Left ventricular hypertrophy and left atrial size are two parameters that may explain the link between blood pressure and the incidence of atrial fibrillation [25] [26].

The CARE algorithm (Comorbidities, Anticoagulation, Rhythm Control, Assess) is an approach recommended in the ESC 2024 recommendations for the holistic management of AF. A wide range of comorbidities is associated with AF

recurrence and progression. The identification and treatment of comorbidities and risk factors play a central role in the success of other aspects of the management of patients with AF [27].

In a meta-analysis of individual data from 22 randomised trials reporting initial AF, a 5 mm Hg reduction in systolic BP reduced the risk of major cardiovascular events by 9% [28].

In our study, hypertension was poorly controlled in more than half the patients. This poor blood pressure control could be explained by the low proportion of patients on combined antihypertensive therapy (dual therapy 17.65%).

Blockers of the renin angiotensin system (ACEI/ARB II) were prescribed in the highest proportion (82%). Several meta-analyses suggest a benefit of RAAS inhibitors (ACE inhibitors = ACE inhibitors or angiotensin II receptor blockers = ARB II) in preventing the onset or recurrence of AF, although these results are mainly observed in populations with heart failure [24].

Atrial fibrillation is a major risk factor for thromboembolism, whether paroxysmal, persistent or permanent [29] [30]. The initiation of oral anticoagulation is recommended when the CHA2DS2-VA score is greater than or equal to 2 [27]. Fewer than half (47%) of patients were on oral anticoagulant therapy based on antivitamin K despite the high risk of thromboembolism in 93%. This low rate of use of VKA-type anti-thrombotics could be explained by the poverty of our patients, which limits the regular performance of biological monitoring, and the geographical distance of patients from laboratories capable of performing INR. None of the patients in our group received direct oral anticoagulants (DAAs) because of their high cost.

Heart rate control is indicated as initial treatment in the acute phase, in association with rhythm control therapies, or as the sole therapeutic strategy for controlling heart rate and reducing symptoms [27]. Treatment to slow the heart rate was initiated in 47% of patients, with digoxin (41%) and beta blockers (18%).

No patient benefited from electrical cardioversion. This therapeutic restriction may be explained by the risk of recurrence and systemic embolic migration.

Our study has certain limitations:

The retrospective nature of this study was a limitation in the collection of data and information. Clinical, biological, electrocardiographic and echocardiographic data were sometimes missing or incomplete. These difficulties limited the interpretation of the results and the discussion.

5. Conclusions

The association of atrial fibrillation and arterial hypertension is common in our current practice, particularly in women and the elderly.

Cardiac decompensation dominated the clinical picture.

More than half of the patients had elevated blood pressure on admission.

The majority of patients with poorly controlled hypertension were on antihypertensive monotherapy. Renin angiotensin system blockers were the most com-

monly prescribed.

Anticoagulant and slowing therapy was introduced in less than half of our patients, despite the high risk of thromboembolism and the high mean heart rate.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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