

Epidemiological, Clinical, Paraclinical and Therapeutic Profiles of Heart Rhythm Disturbances in Patients with Heart Failure at the Renaissance University Hospital Center in N'Djamena, Chad

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How to cite this paper: Ali, A.A., Narcisse, D., Syvain, M., Aboulbarchar, Y., Joyce, S.A., Assane, K., Aware, B.N. and Nadia, T. (2026) Epidemiological, Clinical, Paraclinical and Therapeutic Profiles of Heart Rhythm Disturbances in Patients with Heart Failure at the Renaissance University Hospital Center in N'Djamena, Chad. *World Journal of Cardiovascular Diseases*, 16, 605-613.

<https://doi.org/10.4236/wjcd.2026.169057>

Received: July 14, 2026

Accepted: September 4, 2026

Published: September 7, 2026

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Abstract

Introduction: Heart failure (HF) represents a major public health challenge worldwide, with particularly high morbidity and mortality with its growing burden in sub-Saharan Africa. The objective of this study was to describe the characteristics of arrhythmias in patients with HF in the Renaissance University Hospital Center in N'Djamena, Chad. **Patients and Methods:** This was a retrospective and analytical cross-sectional study conducted over a 5-year period. All medical records of patients who had presented with arrhythmias and were hospitalized for HF in the Cardiology Department were included. We examined sociodemographic, clinical, paraclinical and therapeutic course variables. **Results:** In total, we included 114 cases out of 170 records reviewed. Males were the most common (75%), with a sex ratio of 2.9. The mean age was 54 ± 24 years. The predominant cardiovascular risk factor was hypertension (52%). Clinically, patients presented with left ventricular heart failure in 72% of cases. Supraventricular arrhythmias were the most common, accounting for 70.2% of cases ($n = 80$), of which 38% were atrial fibrillation and 15% were atrial flutter. In addition to treatment for HF, 19.3% of patients had received Amiodarone. External defibrillation was performed in 3.5% of cases. The in-hospital mortality rate was 8.8%. **Conclusion:** This study shows that arrhythmias are common in HF, with a predominance of supraventricular arrhythmias, particularly atrial fibrillation. Optimal treatment of HF and control of risk factors can improve a patients' quality of life and prognosis.

Keywords

Heart Failure, Arrhythmia, N'Djamena

1. Introduction

Heart failure (HF) is defined as the inability of the heart to maintain adequate cardiac output under normal conditions [1]. It is a common condition affecting 1 to 2% of the adult population in developed countries and is the third leading cause of cardiovascular mortality [2]. In sub-Saharan Africa, the hospital prevalence of HF ranges from 25.6% to 30% in Cardiology Departments [3]-[5]. Arrhythmias are common in HF, particularly atrial fibrillation [6]. Their occurrence can increase hospitalizations, readmissions and worsen the prognosis. These arrhythmias can be diagnosed by an electrocardiogram (ECG) or a Holter ECG. Very few studies in our region have addressed this topic. The objective of this study was to describe the characteristics of arrhythmias in HF in our setting.

2. Patients and Methods

This was a retrospective analytical cross-sectional study conducted in the Cardiology Department at the Renaissance University Hospital Center over a 5-year period, from December 1st, 2018 to December 31st, 2023. The study included all medical records of patients who presented with arrhythmias and were hospitalized in the Cardiology Department that was confirmed by an ECG, Holter ECG, or echocardiogram. We excluded incomplete records or those in which no objective signs of arrhythmia were found. Patients with multiple recorded arrhythmias were classified into several different arrhythmia groups. Data were collected using a predefined form developed specifically for this study. The variables studied were:

Studied Variables

- Sociodemographic: age, sex, place of origin, occupation.
- Clinical: reason for hospitalization, medical history, cardiovascular risk factors, functional symptoms, physical signs of heart failure.
- Paraclinical: laboratory tests (complete blood count, blood glucose, lipid profile, serum creatinine, blood electrolyte levels, cardiac biomarkers), electrocardiographic findings (atrial premature beats, atrial flutter, atrial fibrillation, ventricular premature beats, ventricular tachycardia).
- Causes of heart failure (dilated cardiomyopathy, hypertensive heart disease, ischemic heart disease, valvular heart disease, peripartum cardiomyopathy, chronic cor pulmonale, others) and factors contributing to arrhythmias (concurrent infection, anemia, renal failure, hypokalemia, hyperkalemia, hyponatremia).
- Therapies: antiarrhythmics, angiotensin-converting enzyme (ACE) inhibitors,

angiotensin II receptor blockers (ARBs), diuretics, digitalis, nitrates, sacubitril/valsartan, gliflozin, anticoagulants.

- Outcomes: complications or death.

Statistical analysis

Data were entered using Microsoft Excel 2010 and Microsoft Word 2010, and analyzed using SPSS V18.0. Quantitative variables were expressed as means, while qualitative variables were described as percentages. The results were presented in tables.

Declaration of ethics

This study has complied with the Declaration of Helsinki. It was approved by the Faculty of Human Health Sciences of the university under reference number: 116/PC/PMT/MESRI/SE/DGM/UNDJ/SG/FSSH/24, and by the management of Renaissance University Hospital Center under reference number: 093/CHUR/DG/RH/24.

3. Results

In total, we reviewed 170 records, of which 114 patients that had arrhythmias were included, representing a prevalence of 67% (114/170). There were 85 men (75%) and 29 women (25%) with a sex ratio of 2.9. The mean age was 54 ± 24 years. Civil servants accounted for 36% of the cases ($n = 41$). The most common cardiovascular risk factors were hypertension in 52% of cases ($n = 59$), obesity in 24% of cases, and diabetes in 21% of cases ($n = 24$) (**Table 1**).

Table 1. Patient characteristics.

Settings	Number (n)	Percentage (%)
Sex:		
Men	85	75
Women	29	25
Age (years):		
Means	54	
<40	8	7
41 - 50	21	18.4
51 - 60	33	29
61 - 70	31	27.2
>75	21	18.4
Profession:		
Civil servant	41	36
Retired	16	14
Farmer	7	6.1
Shopkeeper	16	14
Housewife	17	15

Continued

Residence:		
Urban	100	88
Rural	14	12
Cardiovascular risk factors:		
Hypertension	59	52
Diabetes	24	21
Dyslipidemia	11	9.6
Smoking	10	9
Obesity	27	24
Kidney failure	9	8

Clinically, the symptoms observed were dyspnea in 81.6% (n = 93) of cases, chest pain in 81.6% (n = 93) of cases, cough in 43% (n = 49) of cases, palpitations in 44.7% (n = 51) of cases and syncope in 7% (n = 8) of cases. Signs of congestive heart failure were present in 72% (n = 82) of cases.

The most common factors associated with arrhythmias were hypokalemia in 31.6% (n = 36) of cases, intercurrent infections in 25.4% (n = 29) of cases and anemia in 16.6% (n = 19) of cases (**Figure 1**).

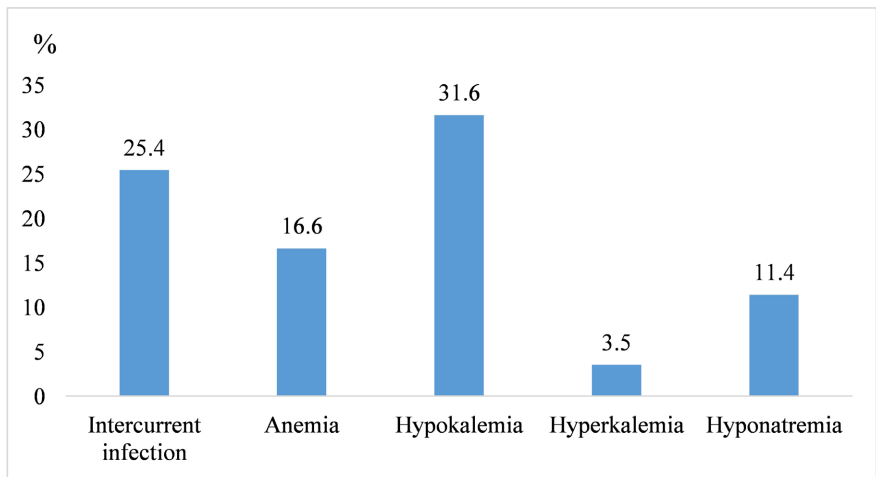


Figure 1. Factors associated with arrhythmias.

Regarding the causes of heart failure, hypertensive heart disease was the most common, accounting for 43% (n = 49) of cases, followed by rheumatic valvular heart disease in 21.1% (n = 24) of cases and ischemic heart disease in 18.4% (n = 21) of cases. The ejection fraction in this study population was most often reduced in 47.3% (n = 54) if cases. With regard to arrhythmias, supraventricular arrhythmias were the most common, accounting for 70.2% (n = 80) of cases, of which 38% (n = 43) were atrial fibrillation and 15% (n = 17) were atrial flutter. In the ventricular compartment, 23.6% (n = 27) of cases were ventricular premature

beats and 6.1% (n = 7) were ventricular tachycardias, including 3 sustained cases (2.6%) (**Table 2**).

Table 2. Electrocardiographic and echocardiographic data.

Settings	Number (n)	Percentage (%)
Causes of Heart Failure:		
Dilated cardiomyopathy	11	9.6
Hypertensive heart disease	49	43
Ischemic heart disease	21	18.4
Rheumatic valvular heart disease	24	21.1
Peripartum cardiomyopathy	3	2.6
Chronic pulmonary heart disease	1	0.9
Other	5	4.4
Ejection Fraction (%):		
Reduced (≤ 40)	54	47.3
Moderately reduced (41 - 49)	19	16.6
Normal (≥ 50)	41	36
Supraventricular arrhythmias:		
Atrial premature beats	16	14
Atrial flutter	17	15
Atrial fibrillation	43	38
Junctional tachycardia	4	3.5
Ventricular arrhythmias:		
Ventricular premature beats	27	23.6
Ventricular tachycardia	7	6.1

Treatment for heart failure was based on diuretics in 85.1% of cases (n = 97), ACE inhibitors in 43% of cases (n = 49), ARBs in 27.2% of cases (n = 31), sacubitril/valsartan in 11.4% of cases (n = 13), and beta-blockers in 78.1% of cases (n = 89). In addition to this treatment, patients received antiarrhythmic drugs based on amiodarone in 19.3% of cases (n = 22) and digitalis in 6.1% of cases (n = 7). External defibrillation was performed in 3.5% of cases (n = 4). Upon admission to the ward, 102 (89.5%) patients had received prophylactic-dose heparin. Subsequently, during hospitalization, 39 (34.2%) patients received therapeutic-dose heparin therapy. At hospital discharge, direct oral anticoagulants were the most frequently prescribed, at 20.2% (n = 23), compared to 14% (n = 16) for vitamin K antagonists (**Table 3**). The in-hospital mortality rate was 8.8% (n = 10).

Table 3. Treatment of heart failure.

Variables	Number (n)	Percentage (%)
Beta-blockers	89	78.1
ACE inhibitors	49	43
ARAI	31	27.2
Diuretics	97	85.1
Digitalis	7	6.1
Nitrates	24	21
Amiodarone	22	19.30
Sacubitril/Valsartan	13	11.4
Sulfonylureas	37	32.4
Anticoagulants:		
Heparin (prophylactic dose)	102	89.5
Heparin (therapeutic dose)	39	34.2
Vitamin K antagonists	16	14
Direct oral anticoagulants	23	20.2

4. Discussion

The study population consisted mainly of men (75%), resulting in a sex ratio of 2.9. The mean age of the patients was 54 years. This finding is consistent with data from studies conducted by several authors [2] [6] [7]. Regarding cardiovascular risk factors, hypertension was the most prevalent (52%), followed by obesity (24%) and diabetes (21%). The same findings have been reported in several sub-Saharan African countries [2] [6] [8]. This high prevalence of cardiovascular risk factors reflects the epidemiological transition our countries are undergoing due to changes in diet and lifestyle, leading to an increase in cardiovascular diseases.

In our study, the majority of patients presented late and at an advanced stage with symptoms of congestive heart failure (72%) and nearly half of the patients had a reduced ejection fraction of 47.3%. This phenomenon may be related to difficulties in accessing care. The causes of HF were varied, with hypertensive heart disease (43%), rheumatic valvular heart disease (21%), and ischemic heart disease (18.4%) being the most common. The majority of African studies have shown this predominance of hypertensive heart disease as well as an increase in ischemic heart disease, although rheumatic valvular heart disease remains a significant cause of HF in our African contexts [7] [9]-[11].

Supraventricular arrhythmias were predominantly atrial fibrillation (38%) and atrial flutter (15%). This finding has been reported by other authors in the West [12] and also by African authors [8] [13]. Indeed, atrial fibrillation is common in patients with HF. Its prevalence is proportional to the severity of HF, ranging from 7% in patients with mild HF to more than 40% in those with advanced HF [12], as was the case with our patients. Atrial fibrillation is an independent predictor of

hospitalization and death in patients with HF [12] [14] [15]. In addition, we observed ventricular premature beats (23.6%) and ventricular tachycardia (6.1%). These ventricular arrhythmias are also frequently reported in HF and can lead to sudden death [13].

The management of arrhythmias is an important aspect of caring for patients with heart failure. The treatment strategy for each patient depends on the type of arrhythmia involved, the underlying heart disease, and the severity of heart failure [12] [16]. In this study, in addition to treatment for HF, the antiarrhythmic therapies administered were beta-blockers (78.1%) and amiodarone (19.3%). Patients with atrial fibrillation received anticoagulant therapy because they are at an increased risk of thromboembolic events, particularly stroke [12]. To restore sinus rhythm, external electrical shock was performed in 3.5% of cases. The management of atrial flutter is identical to that of atrial fibrillation with regard to heart rate control and anticoagulation [17]. To maintain sinus rhythm, radiofrequency catheter ablation has emerged as an excellent option for patients with atrial flutter.

Limitations of our Study

This study has limitations such as a small sample size, a single-center design, and a retrospective approach; nevertheless, it provided a description of the characteristics of arrhythmias in patients with heart failure at the Renaissance University Hospital Center. Our country should prioritize preventive measures, improved access to care, and cardiovascular rehabilitation.

5. Conclusion

This study shows that arrhythmias are common in heart failure, with a predominance of supraventricular arrhythmias, particularly atrial fibrillation. Optimal treatment of heart failure and management of risk factors can improve a patients' quality of life and prognosis.

Author Contributions

Adam Ahamat Ali: conceptualization, methodology, formal analysis, writing—original draft, writing—review & editing; Doune Narcisse: conceptualization, methodology, formal analysis, writing—original draft, writing—review & editing; Mbaïdédjim Sylvain: writing—original draft, writing—review & editing; Yusra Aboulb-achar: writing—original draft, writing—review & editing; Savom Antangana Joyce: data collection, formal analysis, writing—review & editing; Kabore Assane: data collection, formal analysis; Brahim Nassour Aware: data collection, formal analysis; Tessou Nadia: writing—original draft, writing—review & editing.

Conflicts of Interest

The authors declare no conflict of interest.

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