

Characteristics of Heart Failure in Women in an African Cardiology Context

Traoré Fatoumata Diaby*, Bénédicte Carine Boka, Angoran Inès, Micesse Akoto Tanoh, Kouakou N'goran Yves N'da, N'cho-Mottoh Marie Paule, Avoh Ami Echua Manzan, Ehouman Esther, Camara Zenabou, Daniogo Mbe, Keita Massendje Sara, Iklo Coulibaly

Abidjan Cardiology Institute, Abidjan, Côte d'Ivoire

Email: *traofa@yahoo.fr

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Abstract

Objective: We describe the characteristics of heart failure in women in order to contribute to the improvement of therapeutic management. **Method:** This retrospective cross-sectional study included women aged 18 years and older with heart failure, diagnosed based on clinical, radiological, electrocardiographic, and echocardiographic criteria. A total of 236 women were included, representing 48.2% of the 490 patients hospitalized for heart failure in the medical ward during the study period. **Results:** The hospitalization rate for women with heart failure was 48.2%. The mean age was 51.5 years $\pm$ 18.9 years. The most frequent cardiovascular risk factors were hypertension (53%) and diabetes (20.4%). 51.1% of patients were admitted in NYHA class IV, and 54.8% of these had global heart failure. The predominant etiologies were hypertensive heart disease (35.1%), followed by dilated cardiomyopathy (19%) and peripartum cardiomyopathy (18.4%). The main factors contributing to decompensation were bronchopulmonary infections (36%) and non-adherence to treatment (23.8%). Electrocardiographic abnormalities were exacerbated by left ventricular hypertrophy (60.6%) and atrial fibrillation (43.2%). Transthoracic echocardiography most often revealed impaired left ventricular ejection fraction (61.4%). Medical treatment primarily consisted of loop diuretics (95.3%), ACE inhibitors (73.3%), and beta-blockers (72.9%). The mortality rate was estimated at 6.4%. **Conclusion:** Beyond its impact on morbidity and mortality, the proportion of heart failure is becoming increasingly high among young women in sub-Saharan Africa. Prevention requires addressing all cardiovascular risk factors.

Keywords

Epidemiology, Heart Failure, Women, Sub-Saharan Africa

1. Introduction

Cardiovascular diseases are the leading cause of death worldwide. They are responsible for approximately 17.5 million deaths annually, representing 31% of total global mortality [1]. More than three-quarters of these deaths occur in low- and middle-income countries [1]. In Côte d'Ivoire, of the 31% of deaths attributed to non-communicable diseases, 11% are related to cardiovascular diseases, making them one of the leading causes of death [2].

Cardiovascular diseases are responsible for 51% of deaths among women in Europe and 30% in France [3]. They lead to numerous complications, including heart failure. This public health problem is all the more concerning as incidence and mortality are increasing among younger women [4].

In sub-Saharan Africa, heart failure has become a major cardiovascular disease with significant socio-economic consequences due to its high prevalence, high mortality, and impact on younger generations [5]. In African hospital series, its prevalence varies from 25.6% to 45.9% [5], with heart failure with reduced ejection fraction being the most frequent form.

In Côte d'Ivoire, a study carried out in 2017 at the Abidjan Cardiology Institute and the National Police Hospital by Djinguin *et al.* on 989 admitted patients, heart failure represented 60% to 65% of cases with an average age of 55 ± 12 years [6].

Some studies highlight relevant sex-related differences in patients with heart failure. These differences are found in pathophysiology, etiologies, and prognosis [7] [8].

Both men and women are at risk of developing heart failure secondary to all known heart conditions. However, some causes are more common in women: hypertension, thyroid dysfunction, diabetes, obesity, valvular heart disease, and a predisposition to myocardial ischemia [9]. Although women represent a significant proportion of the growing heart failure epidemic in the West, they are underrepresented in clinical trials, despite epidemiological data revealing high prevalence and impact.

Few studies have focused on heart failure in women in sub-Saharan Africa, particularly in Ivory Coast.

Hence the importance of this work, the objective of which was to describe the characteristics of heart failure in women in order to contribute to the improvement of therapeutic management.

2. Patients and Methods

This was a retrospective, single-center, cross-sectional study conducted from January 1, 2019, to December 31, 2021, a period of 36 months, within the medical department of the Abidjan Cardiology Institute. The study included 3148 patient records of those hospitalized in the department during the study period, of which 490 were patients with heart failure, comprising 286 women and 254 men (Figure 1).

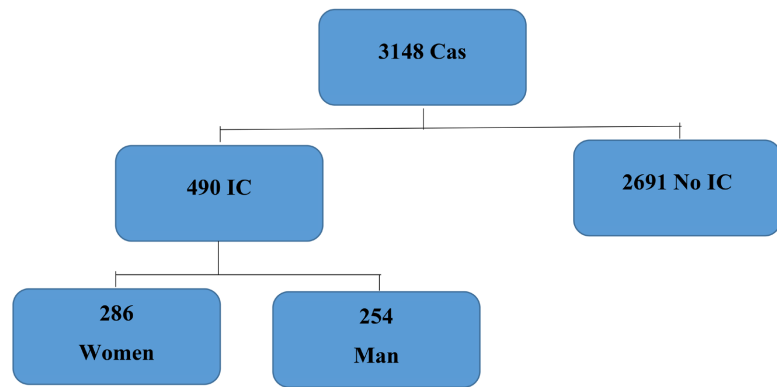


Figure 1. Flow diagram.

Inclusion criteria

The records of all patients aged 18 years and older with diagnosed heart failure were included, based on clinical, biological, radiological, electrocardiographic, and echocardiographic data. Patients with heart failure and those with incomplete medical records were excluded.

From an ethical standpoint

Conducting the study in the medical ward required authorization from the Medical and Scientific Directorate of the Abidjan Institute of Cardiology. Data collection was carried out while respecting the anonymity of the patients and the confidentiality of their information. This was done with the agreement of the head of the department, and an individual identification number was used for each survey form and for data entry. The data were collected using a standardized survey form and analytical methods. The following items were recorded successively for each patient the following parameters: epidemiological, clinical, paraclinical, therapeutic and evolutionary.

All analyses were performed using Epi Info software version 7.2.3.0. Categorical variables are expressed as counts and percentages, and continuous variables as mean and standard deviation or median and range. The significance level was set at 5%.

3. Results

The hospitalization rate for women with heart failure was 48.2% (**Figure 2**).

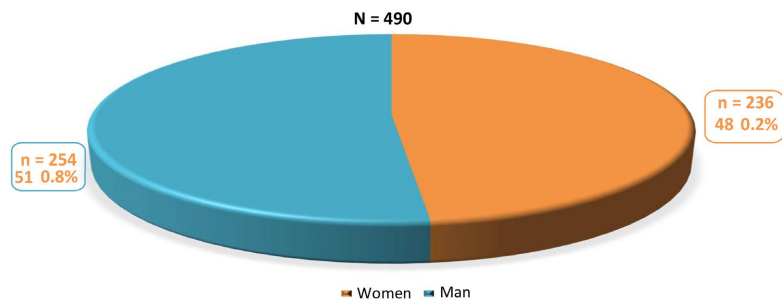


Figure 2. The proportion of heart failure in women.

The mean age was 51.5 years $\pm$ 18.9 years. The most frequent cardiovascular risk factor was hypertension (53%). 51.1% of the women were admitted in NYHA class IV, and 54.8% had global heart failure. The etiologies were dominated by hypertensive heart disease (35.1%), followed by dilated cardiomyopathy (19%) and ischemic heart disease (18.4%). The factors contributing to decompensation were primarily bronchopulmonary infections (36%) and non-adherence to treatment (23.8%). Radiological abnormalities in women with heart failure were dominated by cardiomegaly in 98.8% of cases. Electrocardiographic abnormalities were dominated by left ventricular hypertrophy and atrial fibrillation. Transthoracic echocardiography most often revealed impaired left ventricular ejection fraction (LVEF). The most frequent comorbidity was anemia (22.9%). Treatment was exclusively medical, primarily involving loop diuretics. The majority of patients presented with de novo heart failure (**Table 1**).

Table 1. Synoptic table of sociodemographic, clinical, paraclinical, therapeutic and evolutionary data.

	Staff (n = 236)	Percentages (%)
Middle age	51.5 $\pm$ 12.3 years	
18 - 40	83	35.2
40 - 60	111	47
>60	42	17.8
Residential area	3	
Urban	228	96.6
Rural	8	3.4
Occupation		
housewives	138	58.5
In function	73	30.9
Withdrawn	25	10.6
Marital status		
Brides	102	43.2
Widows	83	35.2
Simple	51	21.6
Insurance		
Not insured	194	82.2
Insured	42	17, 8
Clinical characteristics		
Gynecological and obstetric history, menopause		
Yes	126	53.4
No	110	46.6

Continued

cardiovascular risk factors		
HTA	125	53
Stress	15	6.4
Sedentary lifestyle	24	10.2
Diabetes	57	20.4
Alcohol	5	2.1
Tobacco	4	1.7
Obesity	34	14.4
Dyslipidemia	16	6.8
NYHA Stadium		
Stage II	28	11.9
Stage III	78	33.1
Stage IV	130	55.1
Type of heart failure		
Overall	142	60.2
LEFT	81	34.3
RIGHT	13	5.5
Duration of heart failure		
<1 year	120	50.8
1 to 5 years	93	39.5
5 - 10 years old	18	7.6
>10 years	5	2.1
Paraclinical characteristics		
Cardiothoracic index		
Pupil	226	98.8
Normal	10	4.2
NT-proBNP (pg/l)		
Normal	30	12.7
Pupil	206	87.3
Evolving characteristics		
<7 days	103	45.4
7 to 14 days	77	32.6
>14 days	52	22
Rehospitalizations		
Yes	24	10.2
No	212	89.8
Patient progress		
Life	221	93.6
Deceased	15	6.4

Continued

transthoracic echocardiography		Staff	Percentage
DTDVG	Normal 39 - 50 mm	76	35.7
	Pupil > 50 mm	160	64.3
DTSVG	Normal 23 - 34 mm	108	32.2
	Pupil > 34 mm	128	67.8
DOG	Normal 30 - 43 ml/m ²	162	68.2
	Pupil > 43 ml/m ²	74	31.4
TAPSE	Normal > 16	130	55.1
	Down < 16	106	44.9
FEVG	Amended < 40%	145	61.4
	Modified average 41% - 49%	43	18.2
	Preserved > 50%	48	20.3
E/Ea	Normal < 8	49	20.8
	Intermediate level, ages 8 - 13	47	19.9
	Pupil > 13	140	59.3
PAPS	Normal < 35 mmHg	86	36.4
	Moderate 35 - 50 mmHg	54	22.9
	Severe > 50 mmHg	96	40.7
PAPS	Normal < 35 mmHg	86	36.4
	Moderate 35 - 50 mmHg	54	22.9
	Severe > 50 mmHg	96	40.7
Therapeutic characteristics			
Drugs			
loop diuretic		220	93.3
IEC/ARAI		199	83.3
Beta-blockers		172	71.9
Gliflozins		10	4.2
ARM		132	58.1
Digoxin		46	19.3
Stations		38	16.1
Antiarrhythmics		13	5.5
Calcium channel blockers		8	3.4
Anticoagulants		231	97.9
interventional treatments		22	9.3
electrical treatments		13	5.5
cardiac resynchronization		0	0
Surgery		11	4.7

4. Discussion

The large size of our sample allowed us to obtain high statistical power for the tests performed, thus increasing the likelihood of detecting significant differences in women with heart failure in our setting. However, the main limitations of our study were as follows: the retrospective data collection resulted in a significant number of missing data points, and the available data in the literature on this topic are insufficient and remain highly controversial.

In our series, the hospitalization rate for women with heart failure was 48.2%. Our results are close to those of Karaye *et al.* in Nigeria and Makubi *et al.* in Tanzania, who observed rates of 44.3% [10] and 51% [11], respectively. In contrast, in European hospital registries, Steven M *et al.* found a rate of 38% [12] among women with heart failure. This discrepancy could be explained by delays in care and financial constraints limiting access to treatment in our regions.

The mean age of women with heart failure was 51.5 years $\pm$ 18.9 years. Our results are similar to those of the THESUS study (50.7 years) [13]. In contrast, European and North American studies reported mean ages of 73.1 and 75.1 years, respectively. This difference could be related to lower life expectancy in sub-Saharan Africa, but primarily to the lack of access, for the majority of the population, to healthcare facilities that allow for early detection and effective management of the various cardiovascular risk factors contributing to the development of heart failure.

The most represented age groups were those of [20 - 40] and [60 - 80] years.

The 20 - 40 age group is the one in which peripartum cardiomyopathy is most frequently observed, as shown by studies by Pio in Togo [14], Codjo in Benin [15] and Karaye in Nigeria [10]. This cardiomyopathy mainly affects young women from disadvantaged socioeconomic backgrounds who have already had several pregnancies.

As for the age group between [60 - 80] years, it contradicts the results obtained in developed countries.

Most of the women resided in urban areas (96.6%), particularly in Abidjan, and almost all were housewives. This could be explained, on the one hand, by the presence of the Cardiology Institute in Abidjan, and on the other hand, by the epidemiological evolution of cardiovascular diseases, linked to rapid urbanization and changes in lifestyle, diet and cultural attitudes, as well as the emergence of certain factors known as “cardiovascular risk factors”.

This study revealed that universal health insurance, though essential for an increasingly impoverished population, has not yet been widely adopted since its launch on April 25, 2017, in Côte d’Ivoire. The vast majority of patients (over 82.2%) have no health coverage. This lack of coverage further limits access to quality care.

The majority of patients were married (43.2% of cases). Our results are similar to those in the literature, which report a higher proportion (88%). This could be explained by the presence of certain factors in women, such as chronic stress and

negative emotions like anxiety, anger, and hostility stemming from marital problems in our setting.

Hypertension was present in 53% of women with heart failure. Our results are similar to those of the THESUS study, which found a 51% prevalence of hypertension in women. This could be explained by a greater vulnerability to hypertension in people of African descent.

The combination of hypertension and diabetes increases the risk of death.

In several African studies, diabetes appears as the second leading cardiovascular risk factor after hypertension. Its prevalence was 20.4% in our study, a figure close to that observed by Pio M in Togo (24%) [14]. Multicenter African data and literature reviews have highlighted varying prevalences of diabetes in women with heart failure, ranging from 11% to 59%. This high prevalence of diabetes in these women is likely linked to its alarming proportions worldwide. Analysis of data from the Framingham study, which initially demonstrated a marked increase in the risk of heart failure in people with diabetes, revealed that this risk was 2 to 5 times higher than in non-diabetics [16]. Further research is needed to understand the mechanisms underlying this increased risk of heart failure associated with diabetes in women. Once considered problems specific to high-income countries.

The hormonal changes occurring during menopause lead to a true metabolic and vascular syndrome, with an increase in cardiovascular risk factors. Sex also influences the diagnosis of cardiovascular diseases, as healthcare professionals often fail to consider gynecological and obstetric history as emerging risk factors. These societal biases result in missed opportunities, sometimes with serious consequences, particularly for women in precarious situations who lack access to care [16] [17].

A genuine awareness of the specificities of cardiovascular risk in women led to a red alert in the late 1990s in the United States, with the decennial review of the “Go Red For Women” program led by Lori Mosca, including recommendations for care. At the same time, Peter Collin [18].

It has been recommended that gynecological and cardiological care pathways be implemented at menopause [18]. In Europe, Angela Mass emphasized the urgency of implementing the ambitious Women’s Cardiology Program. It published a “Gynecocardiology Handbook” on cardiovascular diseases in women. More recently, the American societies of cardiology and gynecology have stressed the need for comprehensive women’s care, with the gynecologist finally being recognized as a key player in primary care and cardiovascular screening [18].

At the clinic, more than half of the women admitted were at NYHA stage IV, representing 55.1% of cases. Our results are lower than those of Coulibaly *et al.* [19], who observed 73.6% of cases. However, they are ten times higher than those of the THESUS study (2.9%) [13].

Heart failure was the most frequently observed condition in sub-Saharan Africa. In our context, poverty, delayed medical consultations, lack of access to care, and the use of non-pharmacological therapies could explain this progression to-

wards particularly severe forms of the disease.

Most women had de novo heart failure and an average number of episodes of heart failure of 1.5 ± 0.8 . The duration of heart failure in women does not appear to have a real impact on hospitalizations.

The main factors contributing to decompensation are bronchopulmonary infections and poor treatment adherence. Influenza and pneumococcal vaccination for heart failure patients, recommended by the European Society of Cardiology, appears difficult to implement in our regions due to its cost and a lack of patient awareness. The reliance on traditional medicine and the low level of patient education in sub-Saharan Africa explain these disparities in care. This observation underscores the need to implement a patient education program in our hospitals, which could improve treatment adherence.

In sub-Saharan Africa, several authors have identified hypertensive heart disease as the main cause of heart failure. In our series, it accounted for 35.1% of cases. Our results were higher than those of Coulibaly (28.9%) [20], but lower than those of Soweto (61%) [13].

We believe it is important to prioritize local campaigns in addition to media. We can rely on traditional leaders or introduce the concept of cardiovascular risk factors from primary school onwards, alongside the teaching of communicable and infectious diseases.

Dilated cardiomyopathy (DCM) is one of the most common forms of heart disease in sub-Saharan Africa [13]. It is a serious condition with a poor prognosis, characterized by high mortality, ranging from 15% to 50% [21]. In our series, DCM (19%) was the second leading cause of heart failure after hypertensive heart disease. In Europe, DCM accounts for 20% to 50% of hospitalizations for heart failure after ischemic heart disease. In our study, as in other African series, the patients were relatively young, with a mean age of approximately 50 years [22] [23], compared to Western series where patients were often older due to the longer life expectancy in that region of the world [24].

Perinatal cardiomyopathy, meanwhile, represents the third leading cause of heart failure in women, as it is a mysterious pathology that occurs during the perinatal period due to inflammatory and immunological disorders and oxidative stress triggered during this phase of pregnancy.

Valvular heart disease accounted for 13% of cases in our series. This result could be explained by the relative decline in rheumatic valvular heart disease, attributable to the widespread use of antibiotics and improved lifestyle habits.

Regarding paraclinical characteristics, most women presented with cardiomegaly on chest X-ray (98.8% in our series). This could be explained by the almost systematic presence of cardiomegaly related to the advanced stage of the disease before admission.

Atrial fibrillation (AF) is the most common cardiac arrhythmia worldwide and accounts for one-third of hospitalizations for arrhythmia in Western countries [25]. In our series, it was responsible for 43.2% of cases. Our results are similar to

those of Coulibaly I *et al.* in Côte d'Ivoire, who observed a proportion of 48% [26]. The proportion of AF in patients with heart failure varies from 10% to 30% [27]. This could be explained by the clear predominance of rheumatic valvular heart disease, which very often manifests as heart failure and remains common in developing countries. AF is both a cause and a consequence.

LVH (60.6%) is the most frequently found morphological abnormality on the electrocardiogram in our patients and in the literature.

Heart failure with acute exacerbations remained common (61.4%) in our population. This phenomenon could be linked to a significant increase in cardiovascular risk factors associated with urbanization and lifestyle changes. Other factors contributing to the high proportion of heart failure in women include poverty, which explains delays in seeking medical attention and difficulties accessing care; a lack of awareness of the early signs of heart failure; ignorance; abandonment of conventional treatments and recourse to traditional medicine, prayer, and, sometimes, care provided by unqualified first aiders.

Anemia (common and multifactorial in heart failure) is a poor prognostic factor at all stages of the disease. However, its prevalence in heart failure varies across studies. In women with heart failure, anemia appears to be most often associated with renal insufficiency. This renal insufficiency may result from nephroangiosclerosis, in addition to long-standing, uncontrolled hypertension. Severe renal insufficiency in these patients increases the risk of cardiovascular complications through structural changes in the myocardium, and the anemia may be related to decreased erythropoietin synthesis by the kidneys.

From a biological point of view, BNP and NT-proBNP are the most powerful and widely used prognostic biomarkers in heart failure; they reflect elevated filling pressures and the degree of ventricular dilation.

Regarding treatment, 93.3% of the women in our study received furosemide. This rate is close to the 90% reported by Kingue [28], but higher than the 32.64% reported by Falase [9]. This could be explained by the clinical stage of the disease, with sodium and water retention. Angiotensin-converting enzyme (ACE) inhibitors were used in 83.3% of cases; our results are higher than the 64.7% reported by Kingue [28] and the 61.3% reported by Flather [29]. The rate of beta-blocker use in our study was 71.9%, close to the 78.3% reported by an American study [30] and significantly higher than the 19.8% reported by Kingue [28]. This could be explained by the age of Kingue's study [28], which dates back more than 10 years. These varied observations could be explained by the practitioners' good adherence to European recommendations for the management of heart failure. This management is not exclusively pharmacological; non-pharmacological aspects of treatment are indeed addressed before any medication is administered. Thus, in our study, non-pharmacological treatment was interventional in 9.3% of cases, surgical in 4.7% of cases, and electrical in 5.5% of cases.

However, any surgical indication, whether it be coronary revascularization or valvular surgery, is based on an analysis of the benefit/risk ratio of the operation.

5. Conclusion

Heart failure is common in young hypertensive women with overall heart failure. The most frequent causes are hypertension, idiopathic factors, and the perinatal period. Anemia and bronchopulmonary infections are the main contributing factors to decompensation. This underscores the importance of preventive measures, which should be our priority, as well as the importance of addressing hormonal factors responsible for certain pathologies in women.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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