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ORIGINAL RESEARCH ARTICLE

Epidemiology of acutely decompensated systolic heart failure over the 2003–2013 decade in Douala General Hospital, Cameroon

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Abstract

Aims Acutely decompensated heart failure (HF) (ADHF) is a common cause of hospitalization and mortality worldwide. This study explores the epidemiology and prognostic factors of ADHF in Cameroonian patients.

Methods and results This was a retrospective study conducted between January 2003 and December 2013 from the medical files of patients followed at the intensive care and cardiovascular units of Douala General Hospital in Cameroon. Clinical, electrocardiographic, echocardiographic, and biological data were collected from 142 patients (58.5% men; mean age 58 ± 14 years) hospitalized for ADHF with reduced ejection fraction (HFrEF), whose left ventricular ejection fraction was <50%, or alternatively whose shortening fraction was <28%, both assessed by echocardiography. The commonest risk factors associated with HFrEF were hypertension (59.2%), diabetes mellitus (16.2%), tobacco use (14.1%), and dyslipidaemia (7.7%), respectively. The major causes of HF in hospitalized patients were hypertensive heart disease (40%, *n* = 57); hypertrophic cardiomyopathy (33.8%, *n* = 48); and ischemic heart disease (21.8%, *n* = 31). The most frequent comorbid conditions were atrial fibrillation (25.4%, *n* = 36) and chronic kidney disease (18.3%, *n* = 26). Major biological abnormalities included increased bilirubinemia >12 mg/L (87.5%, *n* = 124); hyperuricaemia >70 mg/L (84.9%, *n* = 121); elevated serum creatinine (65.6%, *n* = 93); anaemia (59.1%, *n* = 84); hyperglycaemia on admission >1.8 g/L (42.3%, *n* = 60); and hyponatraemia <135 mEq/L (26.8%, *n* = 38). At admission, 33.8% (*n* = 48) of patients had no pharmacological treatment for HF. The most frequently used therapies upon admission included furosemide (50%, *n* = 71), angiotensin-converting enzyme inhibitors (ACEIs; 40.1%, *n* = 57); spironolactone (35.2%, *n* = 50); digoxin (26%, *n* = 37); beta-blockers (17.7%, *n* = 25); angiotensin-receptor blockers (ARBs; 7%, *n* = 10); and nitrates (7.0%). The overall in-hospital mortality rate was 20.4%. Factors associated with poor prognosis were systolic blood pressure <90 mmHg [odds ratio (OR) 3.88; confidence interval (CI) 1.36–11.05, *P* = 0.011], left ventricular ejection fraction <20% (OR 7.48; CI 2.84–19.71, *P* < 0.001), decreased renal function (OR 1.03; CI 1.00–1.05, *P* = 0.026), dobutamine use for cardiogenic shock (OR 2.74;CI 1.00–7.47, *P* = 0.049), pleural fluid effusion (OR 3.46; CI 1.07–11.20, *P* = 0.038), and prothrombin time <50% (OR 3.60; CI 1.11–11.68, *P* = 0.033). The use of ACEIs/ARBs was associated with reduced in-hospital mortality rate (OR 0.17; CI 0.02–0.81, *P* = 0.006).

Conclusions Hypertensive heart disease, hypertrophic cardiomyopathy, and ischemic heart disease are the commonest causes of HF in this Cameroonian population. ADHF is associated with high in-hospital mortality in Cameroon. Hypotension, severe left ventricular systolic dysfunction, renal function impairment, and dobutamine administration were associated with worst acute HF outcomes. ACEIs/ARBs use was associated with improved survival.

Keywords Acute heart failure; Epidemiology; Prognosis; Cameroon

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Introduction

Heart failure (HF) is a major growing public health problem globally and is an important cause of death and disability worldwide, with increasing healthcare costs.[1–3] Current estimates suggest that more than 23 million of persons are affected worldwide.[2–6] In the next two decades, the predicted proportional increase in HF prevalence is poised to exceed that of other cardiovascular (CV) diseases, in part because it is the natural outcome of many common CV conditions.[1–5] HF tends to progress over time, ultimately leading to death if left untreated.[2,6] The HF syndrome is increasingly recognized as a significant contributor to CV disease burden in sub-Saharan African (SSA), and as a major public health problem in the region, associated with high morbidity and mortality.[7–11] The increasing burden of HF in SSA is driven by increasing urbanization, changes in lifestyle habits, and ageing of the population, resulting in a significant surge in the prevalence of aetiological factors such as hypertension, type 2 diabetes mellitus, dyslipidaemia, or obesity and detrimental lifestyles characterized by decreased physical activity, increased alcohol intake, and smoking.[7–15] Hypertensive heart disease, rheumatic heart disease, and various cardiomyopathies have been identified as the commonest cause of HF among adults in SSA.[7–9,11,14]

The 2016 guidelines from the European Society of Cardiology distinguish three main types of HF: (i) HF with reduced ejection fraction (EF) or HFrEF (EF $<$ 40%), also known as 'systolic HF'; (ii) HF with mid-range (40–49%) EF (HFmrEF); and (iii) HF with EF $\geq$ 50%.[16] The more severe the systolic dysfunction, the more reduced the EF and, generally, the greater the end-diastolic and end-systolic volumes.[16] Patients with HFrEF are at high risk of disease progression, leading to clinical deterioration, repeat hospitalizations, and death.[2,3,16] Despite advances in therapy and management, HF remains a life-threatening syndrome for many patients. Thus, one in eight deaths in the USA had HF mentioned on the death certificate, 20% of which had HF as the primary cause of death.[17,18] Mortality in African-American individuals was also consistently higher than that in Caucasian patients, with death rates from HF for 2006 at 103.7 per 100 000 for Caucasian male patients vs. 105.9 for African-American male patients. Similar trends were found in women, suggesting an intrinsic increase in mortality risk for Blacks.[17]

Acutely decompensated HF (ADHF) is a life-threatening clinical syndrome characterized by rapid onset or deterioration of symptoms and/or signs of HF, often reflecting decompensation of a pre-existing cardiomyopathy.[18] Globally, both in-hospital and post-discharge mortality are high among patients with acute HF, ranging from 4–12% (in-hospital) to 20–36% (post-discharge).[18,19] In low-income and middle-income countries, in-hospital mortality from decompensated HF has been widely investigated.[7–9] In SSA, while growing evidence suggests that ADHF is the most common primary diagnosis for patients admitted to hospital with heart disease,[7–10] data on this condition are scarce.[7–14,20] To make up for this lack of knowledge, we conducted a retrospective study to explore the epidemiology and prognosis of ADHF in a tertiary healthcare facility in Cameroon.

Methods

Setting and study population

This was a retrospective study carried out in the Cardiology Unit and the Intensive Care Vascular and Medico-surgical Resuscitation Unit of Douala General Hospital between January and April 2014 on patient's data covering the January 2003 to December 2013 period.

Eligible individuals were patients hospitalized at the General Hospital of Douala during the study period and presenting with acutely decompensated chronic systolic HF, aged above 15 years, with left ventricular ejection fraction (LVEF) $<$50% or, alternatively, a shortening fraction (SF) $<$28%. Patients with acute HF arising out of pre-existing systolic dysfunction or those with major data missing in their file, such as LVEF or SF, were excluded.

Procedure and investigations

After identifying patients with chronic systolic HF on the basis on their clinical files, a total of 142 subjects with this condition were retained as study population. Afterwards, files were examined and information collected using a pre-established data record sheet focusing on sociodemographic data; CV risk factors; comorbid conditions; HF causes; prior treatment of chronic HF before decompensation; clinical signs; paraclinical profile, and in-hospital therapies, as well as survival/death as major outcome. In-hospital mortality was used as marker of poor prognosis. LVEF and SF were measured using cardiac transthoracic ultrasonography. Systolic HF was defined as an EF $<$ 50% and/or a SF $<$ 28%, while the term 'decompensated' was coined for a chronic stable HF rapidly deteriorating over time.

Ethical considerations

The study protocol was approved by the Institutional Ethics Committee of the University of Douala, which was also seminal in carrying out this research work, which was conducted in accordance with the guidelines of the Declaration of Helsinki.

Statistical analysis

Data acquisition and analysis were performed using the Statistical Package for Social Science (SPSS) Version 20.0 for Windows (IBM Corporation Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY, USA: IBM Corporation). Continuous variables are expressed as mean with standard deviation, and categorical variables as count (percentage). Non-parametric Mann–Whitney and χ^2 tests were respectively used to compare quantitative and qualitative variables between deceased and living participants, respectively. Multivariable logistic regression was used to determine prognostic factors associated with in-hospital death. Odd ratios were calculated for variables with a P value <0.1 when comparing deceased and living patients. The level of significance was set at $P < 0.05$.

Results

Tables 1 and *2* present characteristics as well as clinical and paraclinical profiles of study participants.

We included 142 patients (58.5% male, mean age: 58 ± 15 years). The two most represented age groups were the 50–65 years (43.66%) and the ≥65 years (32.4%). In this study population, the most common concomitant risk factors associated with systolic HF were hypertension (59.2%, n = 82), diabetes mellitus (16.2%, n = 23), tobacco use (14.1%, n = 20), and dyslipidaemia (7.7%, n = 11), respectively. The most frequent comorbid conditions were atrial fibrillation (25.4%, n = 36), followed by chronic kidney disease (18.3%, n = 26). Other less frequent comorbid conditions were cancer and chronic hepatitis (*Table 1*).

Etiologies and clinical profile of systolic heart failure

The major causes of HF in hospitalized patients were hypertensive heart disease (40%, n = 57); hypertrophic cardiomyopathy (33.8%, n = 48); and ischemic heart disease, the latter assessed by electrocardiogram alterations associated with chest pain together with and or without increased plasma troponin (21.8%, n = 31). Valvular heart disease was present in 2.8% (n = 4). According to the New York Heart Association (NYHA) classification of HF, most patients presented upon admission with Stage IV HF (*Table 1*).

Paraclinical profile

Electrocardiographic abnormalities

Signs of myocardial necrosis were found in 22.5% (n = 32) of patients hospitalized for ADHF, while 25.4% (n = 36) of patients presented with atrial fibrillation.

Table 1 Characteristics of study participants

	All (n = 142)	Death (n = 29)	Alive (n = 113)	P value
Age (years)	58 ± 14	60 ± 11	58 ± 15	0.290
Male gender	83 (58.5)	19 (65.5)	64 (56.6)	0.513
Systolic BP (mmHg)	123 ± 33	112 ± 31	125 ± 33	0.034
Diastolic BP (mmHg)	79 ± 21	73 ± 22	80 ± 20	0.095
Heart rate (bpm)	95 ± 22	101 ± 24	93 ± 21	0.103
LVEF	31.8 ± 11.0	28.7 ± 9.5	32.6 ± 11.4	0.139
Hypertension	84 (59.2)	17 (58.6)	67 (59.3)	0.884
Diabetes	23 (16.2)	4 (13.8)	19 (16.8)	0.911
Dyslipidaemia	11 (7.7)	1 (3.4)	10 (8.8)	0.561
CKD	26 (18.3)	4 (13.8)	22 (19.5)	0.663
Smoking	20 (14.1)	5 (17.2)	15 (13.3)	0.804
Myocardial necrosis	32 (22.5)	4 (13.8)	28 (24.8)	0.311
Atrial fibrillation	36 (25.4)	11 (37.9)	25 (22.1)	0.132
Complete LBBB				
Liver disease	15 (10.6)	3 (10.3)	12 (10.6)	0.767
Cancer	8 (5.6)	1 (3.4)	7 (6.2)	0.904
Hypertensive heart disease	57 (40.1)	14 (48.3)	43 (38.1)	0.430
Hypertrophic cardiomyopathy	48 (33.8)	11 (37.9)	37 (32.7)	0.759
Ischemic cardiomyopathy	31 (21.8)	3 (10.3)	28 (24.8)	0.154
Valvular heart disease	4 (2.8)	1 (3.4)	3 (2.7)	0.690
Anaemia	69 (48.6)	13 (44.8)	56 (49.6)	0.805
Prothrombin time <50%	14 (9.9)	6 (20.7)	8 (7.1)	0.036
Hyponatraemia	38 (26.5)	10 (35.0)	28 (24.4)	0.335
Use of dobutamine	23 (16.2)	9 (31.0)	14 (12.4)	0.032
Use of ACEI/ARAII	137 (96.5)	26 (89.7)	111 (98.2)	0.025
Creatininemia (mg/dL)	27.7 ± 39.8	51.8 ± 74.3	20.4 ± 16.3	0.015

ACCEI, angiotensin-converting enzyme inhibitor; ARA-II, Angiotensin II receptor antagonists; BP, blood pressure; CKD, chronic kidney disease; LVEF, left ventricular ejection fraction.

Table 2 Clinical features of patients with decompensated heart failure

	All (n = 142)	Death (n = 29)	Alive (n = 113)	P value
Dyspnoea NYHA Stage IV	98 (69.0)	24 (82.8)	74 (65.5)	0.117
Malleolar oedema	102 (71.8)	20 (69.0)	82 (72.6)	0.878
Orthopnoea	98 (69.0)	19 (65.5)	79 (69.9)	0.817
Hepatalgia	51 (35.9)	9 (31.0)	42 (37.2)	0.691
Nocturnal paroxysmal dyspnoea	26 (18.3)	4 (13.8)	22 (19.5)	0.663
Crackling or subcrepitant rales	93 (65.5)	20 (69.0)	73 (64.6)	0.824
Turgescence of jugular veins	93 (65.5)	21 (72.4)	72 (63.7)	0.509
Hepatomegaly	68 (47.9)	17 (58.6)	51 (45.1)	0.276
Hepatojugular reflux	67 (47.2)	18 (62.1)	49 (43.4)	0.072
Ascite	53 (37.3)	14 (48.3)	39 (34.5)	0.249
Pleural fluid effusion	15 (10.6)	7 (24.1)	8 (7.1)	0.020
Pulse pressure <50 mmHg	92 (64.8)	21 (72.4)	71 (62.8)	0.456
Systolic BP < 90 mmHg	20 (14.1)	9 (31.0)	11 (9.7)	0.008
LVEF <20%	30 (21.1)	14 (48.3)	16 (14.2)	0.0002
Heart rate >70 bpm	106 (74.6)	22 (75.9)	84 (74.3)	0.9

BP, blood pressure; LVEF, left ventricular ejection fraction; NYHA, New York Heart Association.

Cardiac ultrasound

Almost three-fifths of patients had a LVEF between 20–40%, 21.1% (n = 30) had severely reduced LVEF <20%, and 25.3% (n = 36) had LVEF >40%. Other abnormalities included increased end-diastolic diameter of the left ventricle (>56 mm; 84.8%, n = 120), left atrium dilatation (surface area >15 cm^2; 78.9%, n = 112), raised pulmonary arterial systolic pressure (PAPs >35 mmHg; 50%, n = 71), left auricular area >18 cm^2 (38%, n = 54), and restrictive mitral flow (10%, n = 14).

Laboratory values

Fourteen patients had a measurement of serum brain-type natriuretic peptide (BNP) level on admission, which were all >400 μg/mL. Changes over time of this marker were however not available. Among biological abnormalities predictive of HF mortality were reduced glomerular filtration rate <90 mL/min (88.0% of patients, n = 125); increased bilirubinemia >12 mg/L (87.5%, n = 124); hyperuricaemia >70 mg/L (84.9%, n = 121); elevated serum creatinine (65.6%, n = 93); anaemia (59.1%, n = 84); hyperglycaemia on admission >1.8 g/L (42.3%, n = 60); and hyponatraemia <135 mEq/L (26.8%, n = 38).

Pharmacological treatment for chronic heart failure prior to admission

Upon admission, the most prescribed drug for treatment of chronic HF was furosemide, taken by about half of the patients. Other frequently used therapies included angiotensin-converting-enzyme inhibitors (ACEIs; 40.1%, n = 57); spironolactone (35.2%, n = 50); digoxin (26%, n = 37); beta blockers (17.7%, n = 25); angiotensin-receptor type 1 blockers (ARBs; 7%, n = 10); and nitrates (7.0%). About 10% (n = 14) of patients were taking an association of two drugs, ACEIs + furosemide, or beta blockers + ACEIs. A triple combination therapy including ACEIs + furosemide + spironolactone was taken by 7.8% of patients (n = 10). At admission, 33.8% (n = 48) of patients had no pharmacological treatment at all for chronic HF.

Prognostic factors

Univariate analysis

In-hospital mortality rate was 20.4% in this study population. Among factors significantly (all $P < 0.05$) associated with poor prognosis were systolic blood pressure <90 mmHg (P = 0.005); increased serum creatinine; LVEF <20% ($P < 0.001$); in-hospital use of dobutamine for cardiogenic shock management (P = 0.01); pleural fluid effusion (P = 0.012); and prothrombin time <50% (P = 0.036). The use of ACEIs/ARBs (P = 0.02) was associated with good prognosis. Hepatojugular reflux was also slightly associated with poor prognosis (P = 0.075) and was included in the multivariable model (*Table 3*).

Multivariable logistic regression model (*Table* 3)

Factors independently associated with poor prognosis (all $P < 0.05$) were SBP < 90 mmHg; increased serum creatinine (by 1 mg/L); LVEF <20%; use of dobutamine as shock therapy; and pleural fluid effusion. By contrast, the use of ACEIs/ARBs (P = 0.006) was associated with a good prognostic.

Discussion

The purpose of this study was to describe the epidemiology and prognosis of ADHF in a low-resource setting. Hypertension turned out as the major cause of AD HF, while NYHA Stage IV HF was the most frequent clinical presentation. About one-third of patients had markedly reduced LVEF on admission, with a high case-fatality rate. When measured, BNP levels were clearly elevated. Most patients were taking furosemide or an ACEI upon admission. Systolic hypotension and use of dobutamine, as well as reduced LVEF <20% were independently associated with poor prognosis, while prior use of ACEIs/ARBs was deemed protective.

Men were most represented in this study population, and half of the patients were 50–65 years of age. These findings are in keeping with previous observations of male predominance among African patients with HF, as well as the observation that HF among Africans tends to occur mostly in relatively young patients, the majority of people being in their 5th or 6th decade of life.[7–14,20] This was ascribed to a major contribution of underlying rheumatic valvular heart disease in some African studies,[7–11,13,14] as well as a high frequency of hypertension,[7–14,20] as observed in this study. Both conditions are known to occur in relatively young Africans, to be poorly detected, and inadequately treated.[21,22] However, rheumatic heart disease was not comorbid in this cohort, suggesting that the main cause of HF in this population was elevated blood pressure, known to occur at a young age, and often to follow a severe course, in many African patients.[7–9,11,12,22] Moreover, the last two decades have also witnessed a relative reduction in the prevalence of rheumatic valvular heart disease, to <15.0% in SSA.[8,9,11,13,14,20]

Overall, the prevalence of hypertension was quite high in the present study, affecting almost 60% of participating patients. This observation is supported by previous findings on the contributory role of elevated BP in driving incident HF in SSA,[7–14,20] whereas HF is mainly attributable to coronary heart disease in developed countries.[1–4,16,18,19] Albeit ischemic heart disease was the third cause of HF in this study population, its overall frequency was markedly lower than that reported in Westernized countries,[1–4,16,18,19] but was similar to the figures reported for other SSA countries.[7–10,13,14,20] The prevalence of ischemic heart disease in this study may have been underestimated owing to limited availability of advanced diagnostic techniques in Cameroon. In our study population, even though rheumatic heart disease did not appear to be a major underlying factor, hypertension and cardiomyopathy accounted for almost 75% of HF cases. These findings are consistent with previous observations in Cameroon[12,13] and other African countries.[7–11,20,23,24]

Another relevant finding of this study was the high frequency of chronic kidney disease among patient with ADHF. In addition, impaired kidney function emerged as an independent predictor of poor clinical outcome. This finding is consistent with previous observations from SSA[8,9,12,25] and is in agreement with HF registries from developed countries reporting abnormal kidney function as an independent predictor of poor HF prognosis.[3,15,26–31]

Beyond hypertension and renal dysfunction, other identified comorbidities such as diabetes mellitus, tobacco use, anaemia, hyponatraemia, hyperuricaemia, dyslipidaemia, atrial fibrillation, left atrium dilatation, pulmonary arterial hypertension, and pleural effusion were in line with the comorbidities documented by other surveys in SSA[7,11,13,20,23–25] or in high-income countries.[3,16,19,26–32]

Stage IV of the NYHA classification of HF was the most frequent clinical presentation, as previously reported in SSA,[8,9,11,20–22] suggesting a possible delay in diagnosing the condition in the local setting of this study, in which HF diagnosis is often made and/or confirmed in tertiary healthcare centres after referral by general practitioners.

Of note, the use of best standard-of-care therapies prior to admission was found in less than 10% of patients, while a worrying one-third of them were not receiving any treatment for HF, despite having severely reduced LVEF. The assessment of plasma BNP represents an excellent tool to rule out ADHF in emergency setting. In this study population, only 9.8% of patients had a documented BNP value, which was, as expected, higher than the normal recommended rule-out threshold.[3,16,33] This lower frequency of screening with the use of BNP measurement, together with the high number of untreated patients in our study population, could be explained mainly by financial barriers and severe budget

Table 3 Prognostic factors independently associated with decompensated heart failure

Variables	Crude OR (95%CI)	*P* value	Adjusted OR[a] (95%CI)	*P* value
Systolic BP < 90 mmHg	4.17 (1.53–11.38)	0.005	3.88 (1.36–11.05)	0.011
Hepatojugular reflux	2.14 (0.93–4.94)	0.075	2.01 (0.86–4.72)	0.108
Increase of 1 mg/L in creatininemia	1.03 (1.00–1.05)	0.031	1.03 (1.00–1.05)	0.026
Prothrombin time <50%	3.42 (1.08–10.82)	0.036	3.60 (1.11–11.68)	0.033
Use of ACEI/ARAII	0.16 (0.02–0.98)	0.048	0.17 (0.02–0.81)	0.006
LVEF <20%	5.66 (2.30–13.92)	<0.001	7.48 (2.84–19.71)	<0.001
Use of dobutamine	3.18 (1.21–8.36)	0.019	2.74 (1.00–7.47)	0.042
Pleural fluid effusion	4.18 (1.37–12.72)	0.012	3.46 (1.07–11.20)	0.038

BP: blood pressure; CI, confidence interval; LVEF: left ventricular ejection fraction; OR, odds ratio.
[a]Adjusted for age and gender.

constraints faced by a majority of poor or otherwise economically weak patients.

Importantly, this study observed that only 40% of patients were using ACEIs prior to admission. This figure is lower than the 65–70% of HF patients on ACEIs reported by previous studies in SSA.[7,8,20,22,24] About 17% of our study patients were using beta blockers upon admission. This figure is close to the 19% proportion of patients on beta blockers previously reported from Cameroon[15] and lower than the 25% frequency recently reported from other SSA registries.[7,8] Other relevant drugs with proven benefit for improving HF symptoms and/or reducing morbidity/mortality in HF patients,[16] such as ARBs, aldosterone antagonists, loop diuretics, digoxin, and nitrates, were all poorly used by the patients of this study. Underutilization of such medications is common among HF patients in many SSA countries.[7,8,13,20,24] Kengne et al[13] put the emphasis on the appalling underutilization of medications with proven efficacy on HF, such as ACEIs and beta blockers. This underlines the unmet need and limitations in HF management outside specialized cardiac units in SSA settings and shows how important and relevant it is to sensitize and educate people and healthcare providers on optimal management of this often rapidly lethal condition in a limited resource setting.

The present study found a 20% in-hospital mortality rate for patients with ADHF, a figure far higher than the 8% to 12.5% previously reported in SSA[8,9,13,20] or than figures reported by Westernized countries registries.[18,19] This high mortality rate in these Cameroonian patients with decompensated HF could even worsen over time in the SSA context, given secular rising trends in obesity, hypertension, and adverse cardiometabolic features. This shows the relevance of attempts to improve early diagnosis and management of HF and to tackle modifiable risk factors such as hypertension in SSA globally.

Finally, consistent with previous observations[24,34,35] and as stated by current recommendations,[3,16] the use of ACEI/ARB was found to be protective in the present study. On the opposite, systolic BP $<$ 90 mmHg and use of dobutamine for initial treatment of shock or highly reduced LVEF were associated with increased risk of in-hospital mortality. The poor prognosis of lower systolic BP found in this study is consistent with findings from patient registries in developed countries.[3,16,36] Among hospitalized patients with AD HF and severe reduction of cardiac output compromising vital organ perfusion, or cardiogenic shock, dobutamine infusion often improves symptoms, promotes hemodynamic stability, and restores tissue perfusion.[16,37,38] However, there is growing evidence that dobutamine therapy is associated with worse clinical outcomes in AD HF.[38–40] The worsening patient's outcome related to dobutamine infusion observed in this study might also have been potentiated by limited skills of healthcare providers and sub-optimal technical equipment regarding appropriated titration and close monitoring of patients treated with an inotropic agent in intensive care units. We cannot rule out that a reverse causation phenomenon contributed to this observation, because dobutamine was used in the most severe HF cases that developed shock. In such cases, dobutamine administration is perhaps a sensitive indicator of poor prognosis, not because the medication is toxic, but because patient who receive such inotropic support are in a late stage of HF.

Our findings supported the hypothesis that poorer prognosis of ADHF may result from an interplay between several factors; the respective contribution of which cannot be determined from this retrospective study. Putative factors may include insufficient human and technical resources, lack of appropriate medications, discontinuity of care, environmental influence, health systems inadequately prepared to diagnose and manage HF and related risk factors, and lack of universal health coverage, all important barriers to HF diagnosis and therapy in many SSA countries.[22] Socio-cultural barriers may also limit adequate healthcare for HF, including poor access to healthcare facilities, socio-educational barriers, and high out-of-pocket expenses for treatment. Indeed, most patients in Cameroon must pay all of their medical expenses, which could explain, for example, the finding that more than 30% of patients were not taking drugs for HF.

Importantly, the substantial in-hospital death underlines the need to increase awareness of healthcare providers for early diagnosis and treatment of CV diseases and to arget modifiable risk factors, such as hypertension, in order to reduce the frequency of HF in Cameroon.

Study limitations

This study had several limitations. First, it was a small sample evaluation carried out in a single centre and over an extended time. Over the 10 years of the study period, the definition and treatment of HF have changed, and this might have affected research outcomes inconsistently. This precludes generalizability of the study to other settings and limits the investigation of other classical predictors of mortality in acute systolic HF such as heart rate. Second, in the absence of a systematic combination of biomarkers, such as N terminal-proBNP plus echocardiography to diagnose acute HF in our setting, we cannot rule out the possibility that some cases of ADHF could have been misdiagnosed. Despite these limitations, we believe that this study provides useful information on the clinical features and prognosis of patients with HF in SSA. Moreover, it will provide a blueprint for further clinical research in this area.

Conclusions

This study shows that hypertensive heart disease, hypertrophic cardiomyopathy, hypertrophic cardiomyopathy, and ischemic heart disease are the commonest causes of HF in this Cameroonian population. ADHF is associated with a high in-hospital mortality rate. Hypotension, severe left ventricular systolic dysfunction, renal function impairment, and use of dobutamine emerged as predictors of poor prognosis. Substantial in-hospital mortality underlines the need for efforts to improve in-hospital and community-based management of patient with HF, in order to optimize patients' outcomes.

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