



Pattern and Outcome of Congestive Heart Failure in the Intensive Care Unit of the Yaoundé University Teaching Hospital: A Cross-Sectional Study

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How to cite this paper: Amougou, S.N., Danwe, D., Hamadou, B., Jemea, B. and Jingi, A.M. (2018) Pattern and Outcome of Congestive Heart Failure in the Intensive Care Unit of the Yaoundé University Teaching Hospital: A Cross-Sectional Study. *Open Access Library Journal*, 5: e4247. <https://doi.org/10.4236/oalib.1104247>

Received: December 12, 2017

Accepted: January 12, 2018

Published: January 15, 2018

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Abstract

Background: There is paucity of data on congestive heart failure (CHF) in the intensive care unit in our setting. This study aimed to provide a better knowledge of pattern and outcome of CHF in the intensive care unit of the Yaounde University Teaching Hospital. **Methods:** We carried out a descriptive and retrospective study over a period of 21 months. We collected sociodemographic, clinical, paraclinical outcome and medication data from patients' files. Statistical analysis was done using SPSS Version 20.0 Software. **Results:** We included 24 patients in this study. CHF represented 6.7% of admissions in the ICU. The sex ratio was 1. The mean age was 62 ± 16 years. The most frequent comorbidity was hypertension (50%). Most of the patients (84.6%) were classified Stage IV according to the NYHA. Dyspnea on exertion was the most frequent symptom (87%), while bilateral fine crackles were the main findings on physical exam (75%). Atrial fibrillation was the most frequent abnormality on ECG (53.3%), and most of the patients had a severe decrease in LVEF (87.5%). The mean duration of hospital stay was 10 days. In hospital, mortality was 25%, and this was significantly associated with mean blood pressure < 80 mmHg ($p = 0.045$). **Conclusion:** Clinical patterns of CHF in the ICU differed from those found in standard hospital care. Mean blood pressure was significantly associated with outcome. These characteristics should be taken in account while planning the treatment of these patients.

Subject Areas

Cardiology

Keywords

Pattern, Outcome, Congestive Heart Failure, Intensive Care Unit

1. Introduction

Congestive heart failure (CHF) represents a major public health problem in sub-Saharan Africa [1] [2]. Although there is a lack of national level data on disease trends in these countries, several hospital based studies have shown that CHF has a hospital prevalence in internal medicine services of at least 30% [3] [4] [5]. The hospital mortality varied from one study to another spanning from 9.0% to 25.9% [3] [4] [5] [6]. Hypertension is the first risk factor in sub-Saharan Africa, and most of the patients present with systolic dysfunction [3] [4] [5] [6] [7]. Most of these studies have been done in standard cardiology or internal medicine departments. From our knowledge, CHF has never been assessed in the intensive care units (ICU) in Cameroon. We carried out this cross-sectional study to provide a better knowledge of CHF clinical pattern, management and outcome in the ICU of the Yaoundé University Teaching Hospital (YUTH).

2. Methods

Study design and setting. We conducted a cross-sectional descriptive and retrospective study at the ICU of the YUTH over a period of 21 months from the 1st January 2016 to the 30th September 2017. The YUTH is one of the four main teaching hospitals in the city. The ICU has an eight bed capacity, staffed with a dedicated team of Intensivists and Cardiologists. Yaounde is the political capital of Cameroon, with a population of about 2 million inhabitants.

Participants and measurements. We included patients aged > 18 years, of both sex, admitted in the ICU for CHF from the 1st January 2016 to the 30th September 2017 based on admission register. Their medical records were consulted for sociodemographic characteristics, comorbidities, symptoms and signs, electrocardiographic (ECG) and Doppler echocardiographic findings, clinical outcomes as well as medications at discharge. Patients whose medical records were missing were excluded from the study. Left ventricular ejection fraction (LVEF) was classified as preserved (>50%), moderately altered (40% to 49%) and decreased (<40%) [8].

Sample size and Statistical analysis. The sample size was a convenient sample of all eligible cases of CHF admitted in the ICU of the YUTH. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0 software. Results are expressed as counts and percentage for qualitative variables, and as mean and standard deviation, minimum and maximum for quan-

titative variables. We assessed the odds of poor outcome in univariate analysis. A p value < 0.05 was considered statistically significant for the observed associations.

Ethical considerations. This study was approved by the institutional review board of the Faculty of Medicine and Biomedical Sciences, University of Yaounde 1. Administrative authorization was obtained from the hospital. We carried out this work in accordance with the declarations of Helsinki. We report this work according to the STROBE checklist.

3. Results

During the study period, 37 patients were admitted for CHF. The files of 13 patients (35.0%) were unexploitable or missing. CHF represented 6.7% of admissions in the ICU during the same period. Men and women were equally represented. The mean age was 62 ± 16 years. The most frequent comorbidities were hypertension (50.0%), HIV/AIDS (20.8%), diabetes and chronic kidney disease (12.5% respectively) [Table 1]. Dyspnea on exertion was the most frequent symptom (87%) followed by asthenia (83.3%) and lower limb edema (50%) [Figure 1]. The majority of the patients (84.6%) were classified stage IV

Table 1. Comorbidities present in the study population.

Comorbidities	Frequency	Percentage (%)
Hypertension	12	50.0
HIV infection	5	20.8
Diabetes	3	12.5
CKD	3	12.5
Viral hepatitis	2	8.3
Total	24	100

HIV = human immunodeficiency virus; **CKD** = chronic kidney disease.

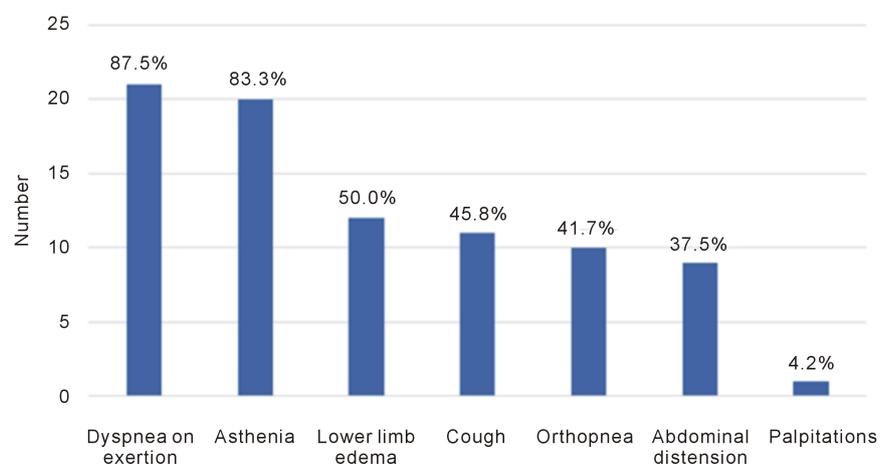


Figure 1. Symptoms of heart failure.

according to the New York Heart Association (NYHA) classification of CHF, and 15.4% at stage III. Physical signs were predominantly bilateral fine lung crackles (75%), hepatomegaly, ascites and lower limb edema (45.8% respectively) [Figure 2]. The main anomalies on the ECG were atrial fibrillation (53.3%) and ventricular premature beats (46.7%). Most patients had a decreased LVEF (87.5%), while only one patient had a preserved LVEF [Table 2]. The cardiac disease in our series was mainly dilated cardiomyopathy [Table 3]. The mean duration of hospital stay was 10 days, ranging from 1 to 26 days. In hospital mortality was 25%. Low mean blood pressure was significantly associated with poor outcome [Table 4]. At discharge, surviving patients received loop diuretics (100%), digitalis (66.7%), angiotensin converting enzyme inhibitors/angiotensin receptor blockers (50%) and beta-blockers (16.7%) [Figure 3].

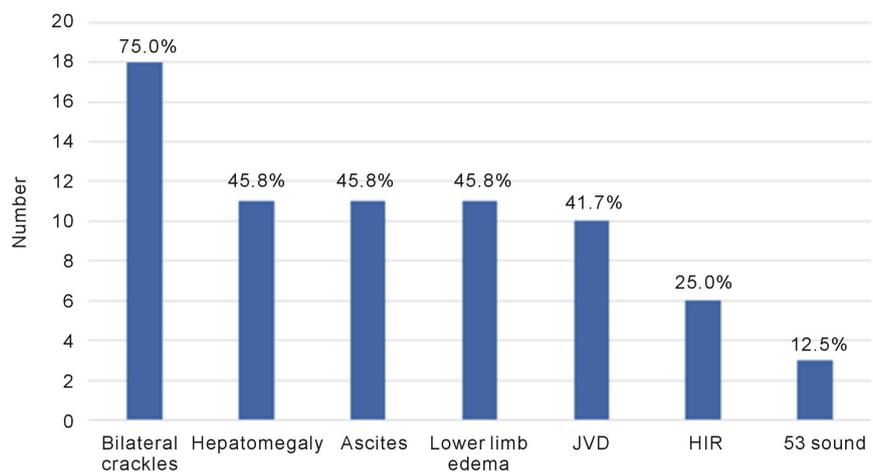


Figure 2. Physical signs of heart failure (JVD = jugular venous distention; HJR = hepato-jugular reflux).

Table 2. Classification according to the Left Ventricular Ejection Fraction (LVEF).

LVEF (%)	Frequency	Percentage (%)
<40	14	87.5
40 - 49	1	6.2
≥50	1	6.2
Total	16	100

LVEF = left ventricular ejection fraction.

Table 3. Types of heart diseases from the results of echocardiography.

Type of heart disease	Frequency	Percentage (%)
Dilated cardiomyopathy	11	68.8
Ischemic cardiomyopathy	4	25.0
Hypertrophic cardiomyopathy	1	6.2
Total	16	100

Table 4. Factors associated with in hospital mortality.

Variable	Alive, n (%)	Dead, n (%)	OR (CI 95%)	P value
Age (years)				
≥60	13 (72.2)	3 (50.0)	2.60 (0.39 - 17.45)	0.302
<60	5 (27.8)	3 (50.0)		
Gender				
Male	9 (50.0)	3 (50.0)	1.00 (0.16 - 6.35)	0.680
Female	9 (50.0)	3 (50.0)		
MBP (mmHg)				
<80	3 (17.6)	4 (66.7)	9.33 (1.14 - 76.69)	0.045
≥80	14 (82.4)	2 (33.3)		
LVEF (%)				
≤25	6 (42.9)	2 (100.0)	NA	0.233
>25	8 (57.1)	0 (0.0)		

OR: odds ratio; CI: confidence interval; n: number; %: percentage; MBP: mean blood pressure; LVEF: left ventricular ejection fraction; NA: not applicable.

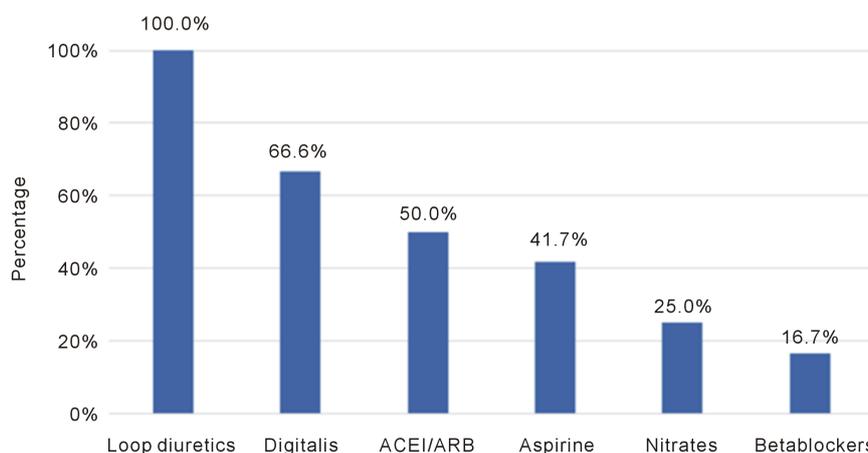


Figure 3. Heart failure drug classes used at discharge (ACEI = angiotensin converting enzyme inhibitors; ARB = angiotensin receptor blockers).

4. Discussion

CHF represented 6.7% of all admissions in the ICU of the Yaounde University Teaching Hospital. This proportion is far from the 30% and 33.3% reported by Kingue *et al.* [4], and Boombhi *et al.* [5] at the Cardiology departments of the Yaounde General and Central Hospitals, and can be explained by the fact that the YUTH ICU does not take care of cardiology patients only, but of all patients needing special care, whatever their pathology. The mean age of 62 years is consistent with that reported by Kingue *et al.* and Boombhi *et al.* but higher than the 42.5 years reported by Tantchou *et al.* [6]. The reason is that, many patients in Tantchou *et al.* series were children who developed CHF secondary to lately diagnosed congenital heart diseases.

The main risk factor found was hypertension (50%) which is consistent with data reported in the literature [3]-[9]. HIV/AIDS was also an important co-mor-

bidity (20.8%). Magula and Mayosi concluded in a review that showed that HIV infection may be as well an etiologic factor of heart disease as an aggravating factor [10].

Dyspnea on exertion was the most frequent presenting complain as found by Kingue *et al.*, Tantchou *et al.*, Pio *et al.* and Boombhi *et al.* [4] [5] [6] [7], and the majority of patients were classified stage IV according to the NYHA, pointing to the fact that people consult lately in sub-Saharan Africa.

In our series, bilateral fine crackles were the most common physical sign corroborating with the findings of Boombhi *et al.*, followed by hepatomegaly, while Kingue *et al.* found that hepatomegaly was the most frequent physical sign [4] [5]. The fact that our patients were at a more advance stage of the disease than theirs may explain this difference in result.

Considering the findings on ECG, atrial fibrillation was the most common abnormality found which is consistent with the results of Boombhi *et al.*, but different from those of Thiam *et al.*, Tantchou *et al.*, and Pio *et al.*, who found ventricular hypertrophy as the main finding [3] [6] [7]. The greater proportion of advanced stages of heart failure in our series, which we know lead to dilatation of heart chambers, and responsible for the appearance of atrial fibrillation is the most probable explanation for this.

As reported in the literature, the majority of patients had systolic dysfunction, with most of them having a decreased LVEF, and Dilated cardiomyopathy the most common type of cardiopathy [4] [6] [7].

The mean duration of hospital stay in our series was 10 days, in concordance with the median 10 days reported in a Haitian series [11]. The hospital mortality of 25% is comparable to the 18.4% reported by Boombhi *et al.* at the Cardiology department of the Yaounde Central Hospital, but far higher than the 9 and 9.2% reported by Kingue *et al.*, and Tantchou *et al.* [4] [5] [6]. We had in our series and the one of Boombhi *et al.* respectively 84.6% and 65.8% of patients at stage IV heart failure compared to 7% in the other series. This suggests that mortality rates increases with the stages of CHF. We also found out that the mean blood pressure was significantly associated with outcome. This suggests that efforts should be made to maintain the above 80 mmHg so as to reduce in-hospital mortality.

There is still little prescription of beta-blockers for heart rate control in sub-Saharan Africa [4] [6], even after a hospital stay in the ICU, as it is in the internal medicine departments of hospitals in this region. Meanwhile, two thirds of the patients in our series were prescribed digitalis upon discharge, far higher than the 30.5% reported by Kingue *et al.* [4].

5. Limitations and Strength

The main weakness of this study is the retrospective design, resulting in loss of data as the files of patients could not be found. This did not permit us assess the incidence of heart failure in the ICU. The small sample size also reduced the

power to detect significant associations. Despite these weaknesses, this is the first study of heart failure in the intensive care unit in our setting. We have shown that the mean blood pressure is a determinant of outcome in these groups of patients. This study also paved the way for further studies of heart failure in the ICU in our setting.

6. Conclusion

Patten and outcome of CHF in ICU in Cameroon are comparable to those found in internal medicine department with respect to the disease stage. However, most patients were admitted at late stages of the disease in ICU. Low mean blood pressure was significantly associated with poor outcome. Digitalis is used in higher proportions.

Conflict of Interest

Authors declare no conflict of interest.

Contribution of Authors

Sylvie Amougou Ndongo, Dieudonné Danwe and Bâ Hamadou designed the study. Dieudonné Danwe, Sylvie Amougou Ndongo and Bonaventure Jeméa collected the data. Dieudonné Danwe did all statistical analysis. Sylvie Amougou Ndongo and Jingi Musa Ahmadou contributed in supervising the study. All the authors have read and agreed with the final version of the manuscript.

Acknowledgements

We address acknowledgments to the Yaoundé University Teaching Hospital intensive care unit staff members.

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