

In-hospital mortality among patients admitted for hypertension-related complications in Goma, in the Democratic Republic of the Congo

Abstract

Introduction: The aim of this study was to determine the in-hospital mortality rate related to complications of hypertension in Goma.

Material and methods: We conducted a retrospective and analytical study during the study period from 1st January 2020 to 31st December 2021. We assessed in-hospital mortality among patients admitted for hypertension-related complications in 8 hospitals in Goma, the Democratic Republic of the Congo. We modeled the probability of death using stepwise logistic regression.

Results: Of 485 hypertensive patients (mean age: 60.57 years; 221 women), 67 (13.8%) were unaware that they had hypertension. Among 418 conscious patients (86.2%), 25 (6.0%) were not taking antihypertensive medication. During the 15 days (median) of hospitalization, 181 deaths (37.2%) occurred. The multivariate adjusted probability of death increased with comorbidities: heart failure (adjusted OR=4.1; 95% CI: 1.76-10.8), chronic renal failure (adjusted OR= 5.43; 95% CI: 1.97-17.8), and cerebrovascular complications of hypertension (adjusted OR=2.14; 95% CI: 1.28-3.61).

Conclusion: In-hospital mortality of African patients hospitalized for hypertension-related disorders in Goma is above 30%. These results highlight that screening and treatment of hypertension and prevention of cardiovascular disease should be much higher on the political agenda in sub-Saharan Africa.

Keywords: hypertension, complications, hospital mortality, goma

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Introduction

Hypertension is a global health problem with significant health and economic ramifications. Current estimates indicate that 34% of US adults aged 20 years or older, or more than 85 million people, suffer from this "silent killer".¹ Importantly, hypertension is a contributing factor to the development of cardiovascular, metabolic, renal, pulmonary, and neurological diseases/complications that result in high mortality rates, particularly in the elderly.¹⁻⁶ The significantly high prevalence and considerable influence on various disease states mean that hypertension is a major financial burden on the healthcare system, which is expected to exceed \$220 billion by 2035 (the 2013-2014 estimate was \$53 billion).¹

Hypertension is considered the leading contributor to cardiovascular disease, which remains the leading cause of death worldwide, accounting for almost one-third of global mortality.⁷ With a death rate of approximately 17 million deaths per year worldwide, almost one-third of total mortality; 9.4 million of these deaths per year are attributable to complications of hypertension. Hypertension is responsible for at least 45% of deaths from heart disease and 51% of deaths from stroke.⁸

Between 2006 and 2007, 8.5% of deaths in Canadian men were attributable to hypertension compared to 5.8% in Canadian women.¹⁰ Of all causes of death among hypertensive patients, the proportion of deaths from cardiovascular causes was 31.0% between 2000 and 2006 in the same country.¹¹

In Africa, there is still far too much emphasis on infectious diseases. However, silent killers such as diabetes mellitus, hypertension, and non-communicable diseases in general deserve more attention. In several African countries, almost half of the adult population suffers from hypertension. Unrecognized or poorly treated, hypertension can cause severe damage to the arteries of the brain, heart, and kidneys, leading to serious complications, including stroke, heart attack, heart failure, and kidney failure. These complications often lead to early death or disability.¹² Hypertension in sub-Saharan Africa has become an important public health problem in recent decades due to its prevalence and complications. In a recent community survey of hypertension in Lubumbashi (in the Democratic Republic of the Congo ^[DRC]), Musung et al.¹³ report a high prevalence of hypertension (33.6%).

In a study conducted at Loandjili Hospital in Pointe Noire (Republic of Congo) on the morbidity and mortality of hypertension, it

accounted for 18% of adult admissions or 83.3% of all cardiovascular diseases. It was by far the most important cardiovascular disease, the almost exclusive cause of stroke in relatively young patients, with a case fatality of 4.7%.¹⁴ Hypertension and its complications alone were responsible for all cardiovascular diseases. These complications were represented respectively by left ventricular hypertrophy, stroke, heart failure, renal failure, complete arrhythmia due to atrial fibrillation, hypertensive retinopathy, and ventricular extrasystole. These numerous complications are not only due to hypertension alone, but also to other associated risk factors such as age, obesity, diabetes mellitus, alcoholism, and smoking.^{14,15}

Hypertension is the most frequent pathology in hospitalization with 79.4% of patients and is the most common risk factor found.¹⁴ The death rate from cardiovascular disease was 11% in 2011 in Cameroon.¹⁵ In Nigeria, non-communicable diseases including hypertension, obesity, and their complications were responsible for 27% of deaths in 2008.⁹

In the DRC, complications of hypertension are the leading cause of death in adults.^{16,17} In Goma, to date, no study has been published on this subject and data on the hospital prevalence and hospital mortality of hypertension complications are not available. This motivated the present study to determine the hospital mortality rate related to hypertension complications in Goma city (in DRC) in order to contribute to the improvement of the medical follow-up conditions of hypertensive patients in this city.

Material and methods

Study setting, type, and period

This study was conducted in the 8 major health facilities in the city of Goma, which are: North Kivu Provincial Hospital, Charité maternelle General Reference Hospital, Kyeshero Hospital, Military Hospital, Virunga General Reference Hospital, Muungano Hospital, Notre Dame Hospital, and Heal Africa Hospital. The city of Goma is the capital of the province of North Kivu in the Eastern Democratic Republic of the Congo and has an estimated population of 2.1 million in 2021.

This was an analytical cross-sectional study that covered a period of one year from January 1, 2020 to December 31, 2021.

Study population, sampling, and sample

From 2020 to 2021, 6,567 patients were admitted to the above hospitals. We assessed in-hospital mortality in 485 consecutive patients (6.1% of all admissions), who were specifically hospitalized for hypertension-related conditions. Our sampling was exhaustive.

The inclusion criteria were:

- Hypertensive patient hospitalized during the study period for a complication of hypertension, aged at least 18 years;
- Patients who consulted for symptoms of hypertension or signs of its complications.

Pregnant women were excluded from the study.

Studied variables

In-hospital mortality due to hypertension complications was considered a dependent variable. The independent variables were socio-demographic characteristics (age, sex), diagnosis of hospitalization and other cardiovascular risk factors or co-morbidities (smoking, alcohol consumption, diabetes mellitus, obesity, renal failure, heart failure).

Data were collected by documentary analysis from hospital registers and data from patients admitted during the whole study period.

Data analysis

After data entry and processing in Microsoft Excel, the data were analyzed using R software, version 4.0.3. The data were expressed in tables and figures. We used percentage, mean, chi-square and Kaplan Meier probability of follow-up calculations to highlight the probability of survival of hypertensive inpatients.

Results

In-hospital prevalence and mortality of hypertension complications

We registered 899 hypertensives of whom 485 were admitted for hypertension-related complications, giving a hospital prevalence of hypertension complications of 53.95%. Of the 485 hypertensives with hypertension complications, 181 died during hospitalization, giving a hospital case fatality rate of 37.2% (Table 1).

Patient characteristics

Our study (Table 2) included 485 hypertensive patients, of whom 264 were women (54.4%), with an average age of 60.57±13.57 years. On admission, 418 patients (86.2%) were aware of their disease (Table 2). Of those who knew they had hypertension, 393 (94%) were on antihypertensive treatment (Table 2). Awareness of the disease was higher in deceased patients compared to survivors ($p<0.001$) (Table 3), but there was no statistically significant difference in the use of antihypertensive treatment at admission between the two groups ($p=0.726$) (Table 3).

The majority of cases were recorded at North Kivu Provincial Hospital and Kyeshero Hospital with 35.4% and 29.80% respectively. The most frequent hypertension complications for which patients were admitted to the hospital were cerebrovascular complications (38.6%), metabolic syndrome (28.7%), and hypertensive heart disease (22.3%).

Predictors of in-hospital mortality

The median length of hospital stay was 15 days (range: 0 and 741 days) and the probability of survival decreased to below 25% from day 250 of hospitalization (Figure 1). During this period, 181 deaths (37.2%) occurred out of all the hypertensive patients registered during the study period (Table 1).

In unadjusted analyses, untreated disease-aware patients had significantly higher mortality than treated disease-aware patients ($p=0.045$), and untreated disease-unaware patients ($p=0.045$) (Figure 2). When patients were dichotomized into only two groups according to treatment status at admission, the difference in survival between untreated and treated patients was not significant ($p=0.726$) (Table 3). All-cause mortality was also significantly higher in male patients ($p=0.048$) (Table 3), in patients with chronic renal failure ($p=0.002$) (Table 4), heart failure ($p=0.011$) (Table 4), in patients admitted with cerebrovascular complications ($p<0.001$) (Table 5), in patients admitted with hypertensive heart disease ($p=0.036$) (Table 5), in patients admitted for nephropathy and hypertensive heart disease simultaneously ($p=0.006$) (Table 5).

Table 6 shows the multivariate-adjusted odds ratios for all-cause mortality. The probability of death increased with heart failure (adjusted OR=4.1; 95% CI: 1.76-10.8; $p=0.002$), renal failure (adjusted OR=5.43; 95% CI: 1.97-17.8; $p=0.002$), and cerebrovascular complications (adjusted OR=2.14; 95% CI: 1.28-3.61; $p=0.004$).

Table 1 In-hospital prevalence and mortality of hypertension complications

Year	Number	Prevalence of hypertension	Prevalence of hypertension complications	Mortality of hypertension	Mortality of hypertension complications
2020	7,378	432 (5.9%)	231 (53.5%)	100 (23.2%)	84 (36.4%)
2021	7,831	467 (6.0%)	254 (54.4%)	109 (23.3%)	97 (38.2%)
Total	15,209	899 (6.0%)	485 (54.0%)	209 (23.2%)	181 (37.2%)

Table 2 Characteristics in 485 hypertensive patients

Variable	N = 485
Age (years), mean (±SD)	60.57 (±13.57)
Age class	
18-35 years	20 (4.1%)
36-64 years	258 (53.2%)
≥65 years	207 (42.7%)
Sex	
Female	264 (54.4%)
Male	221 (45.6%)
Awareness of hypertension status	
No	67 (13.8%)
Yes	418 (86.2%)
Antihypertensive treatment intake	
Knows he/she has hypertension and is not taking antihypertensive medication	25 (5.2%)
Knows he/she is hypertensive and on antihypertensive medication	393 (83.0%)
Does not know himself/herself as hypertensive	67 (13.8%)

Table 3 Patient characteristics associated with mortality in 485 hypertensive patients

Variable	Hypertension-related mortality		Odds ratio	95% Confidence interval	p-value
	Survivor (n = 304)	Deceased (n = 181)			
Age (years), mean (±SD)	58.38 (±12.91)	64.24 (±13.90)	1.03	1.02 – 1.05	<0.001
Age class					
18-35 years	14 (4.6%)	6 (3.3%)	1.00	—	
36-64 years	182 (59.9%)	76 (42.0%)	0.97	0.38 – 2.84	1.000
≥65 years	108 (35.5%)	99 (54.7%)	2.14	0.82 – 6.24	0.130
Sex					
Female	176 (57.9%)	88 (48.6%)	1.00	—	
Male	128 (42.1%)	93 (51.4%)	1.45	1.00 – 2.11	0.048
Awareness of hypertension					
No	56 (18.4%)	11 (6.1%)	1.00	—	
Yes	248 (81.6%)	170 (93.9%)	3.49	1.84 – 7.20	<0.001
Antihypertensive treatment intake					
No	14 (56.0%)	11 (44.0%)	1.15	0.51-2.61	0.726
Yes	234 (59.5%)	159 (40.5%)	1.00	—	

Table 4 Cardiovascular risk factors associated with mortality in 485 hypertensive patients

Variable	Hypertension-related mortality		Odds ratio	95% Confidence interval	p-value
	Survivor (n = 304)	Deceased (n = 181)			
Diabetes mellitus					
No	182 (59.9%)	110 (60.8%)	1.00	—	
Yes	122 (40.1%)	71 (39.2%)	0.96	0.66 – 1.40	0.800
Heart failure					
No	237 (78.0%)	122 (67.4%)	1.00	—	
Yes	67 (22.0%)	59 (32.6%)	1.71	1.13 – 2.59	0.011
Chronic renal failure					
No	276 (90.8%)	146 (80.7%)	1.00	—	
Yes	28 (9.2%)	35 (19.3%)	2.36	1.39 – 4.06	0.002
Obesity					
No	285 (93.8%)	176 (97.2%)	1.00	—	
Yes	19 (6.2%)	5 (2.8%)	0.43	0.14 – 1.08	0.100
Smoking					
No	292 (96.1%)	175 (96.7%)	1.00	—	
Yes	12 (3.9%)	6 (3.3%)	0.83	0.29 – 2.19	0.7
Alcohol intake					
No	278 (91.4%)	173 (95.6%)	1.00	—	
Yes	26 (8.6%)	8 (4.4%)	0.49	0.21 – 1.07	0.090

Table 5 Hypertension complications associated with mortality in 485 hypertensive patients

Variable	Hypertension-related mortality		Odds ratio	95% Confidence interval	p-value
	Survivor (n = 304)	Deceased (n = 181)			
Metabolic syndrom	107 (35.2%)	32 (17.7%)	1.00	—	
Hypertensive heart disease	70 (23.0%)	38 (21.0%)	1.82	1,04 – 3.19	0.036
Cerebrovascular complications	98 (32.2%)	89 (49.2%)	3.04	1,88 – 5.00	<0.001
Peripheral vascular complications	2 (0.7%)	0 (0.0%)	0.00	Ind.	1.000
Nephropathy and hypertensive heart disease	1 (0.3%)	6 (3.3%)	20.1	3,27 – 386.0	0.006
Nephropathy	26 (8.6%)	16 (8.8%)	2.06	0.97 – 4.29	0.055

Table 6 Multivariate logistic regression analysis of factors associated with mortality in 485 hypertensive patients

Variable	Adjusted odds ratio	95% Confidence interval	p-value
Heart failure	4,10	1,76 – 10,8	0,002
Chronic renal failure	5,43	1,97 – 17,8	0,002
Cerebrovascular complications	2,14	1,28 – 3,61	0,004

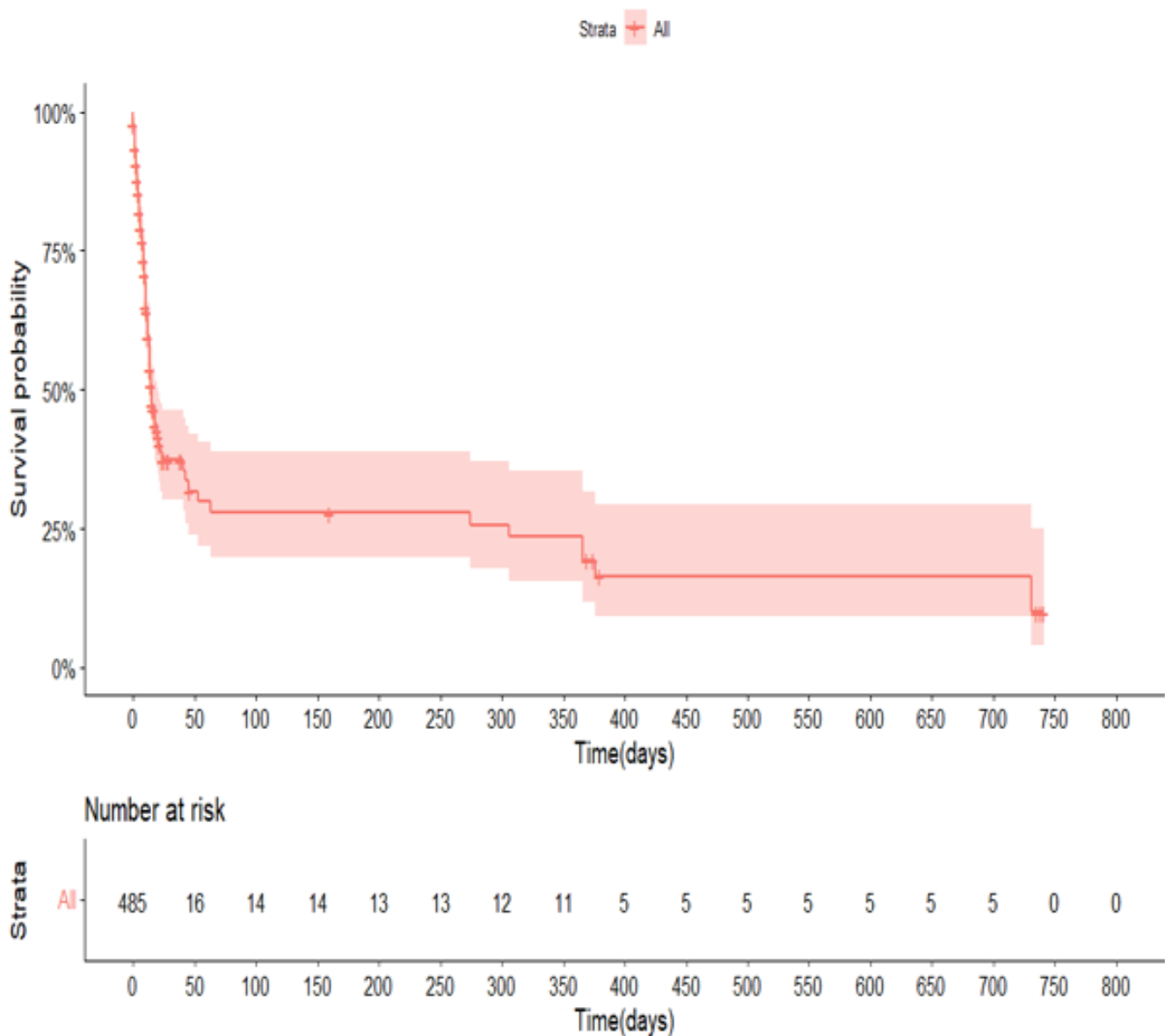


Figure 1 Probability of survival in 485 hypertensive patients.

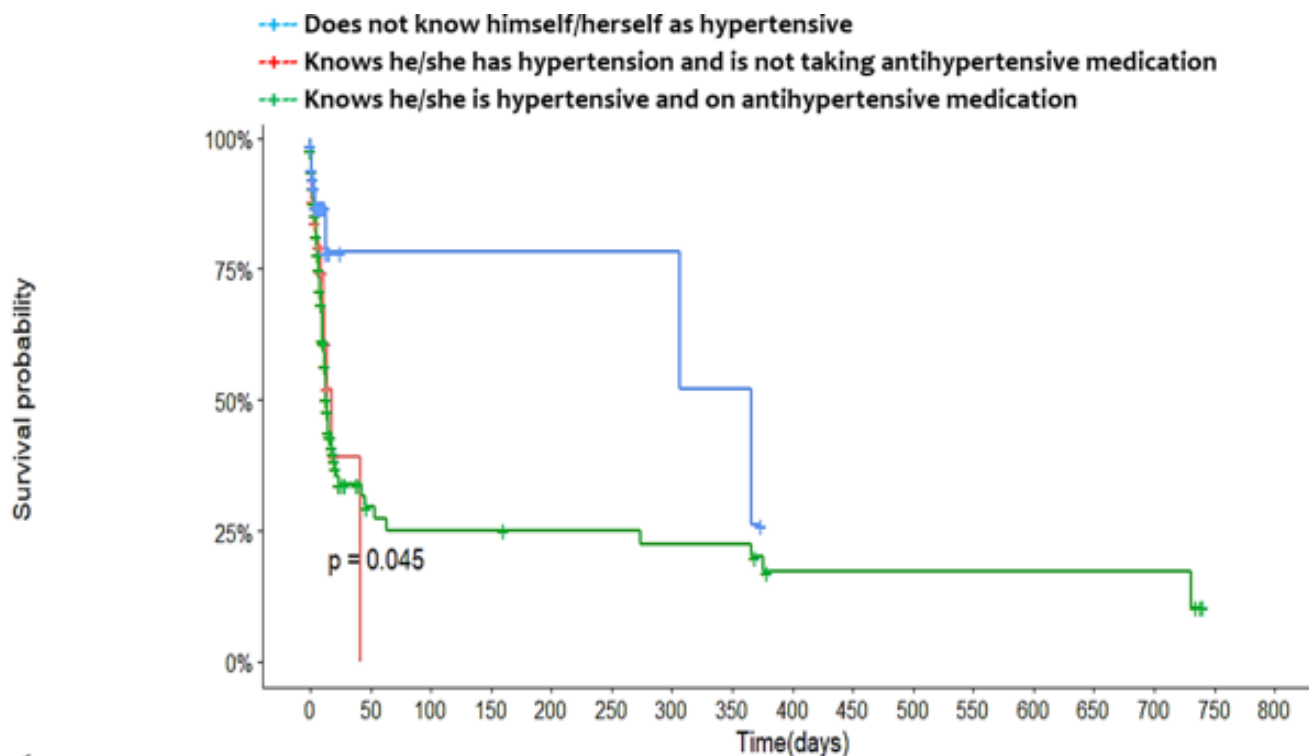


Figure 2 Survivability according to awareness of hypertension status.

Discussion

The present study shows that among patients hospitalized for hypertension-related disorders in 8 hospitals in the city of Goma, mortality within a median of 15 days after admission reached 37.2%. Mortality was significantly associated with comorbidities mainly chronic renal failure, heart failure and cerebrovascular complications of hypertension.

With regard to mortality, our results are superior to the series by M'Buyamba et al.¹⁸ in Mbuji-Mayi who found a mortality of 22.2%. This difference can be explained by the fact that between 2009 and 2021, the prevalence of hypertension and cardiovascular diseases has increased over time, including mortality. The in-hospital mortality rate in our series was almost three times higher than in a previous report by Diallo et al.¹⁹. These investigators found that among 7,491 patients admitted from 1991 to 1992 to the emergency department of a university hospital in Abidjan (Ivory Coast), hypertension was the reason for hospitalization in 620 cases. The mortality rate of 13.0% was higher than in patients admitted for other reasons (7.2%).²⁰ Apart from the aspect of time elapsed between their studies and ours, their sample also included hypertensives hospitalized for other problems besides complications of hypertension. Of 3,317 acute medical admissions to a teaching hospital in Ghana, 593 (17.9%) were due to cardiovascular disease, mainly hypertension, heart failure or stroke. Of these patients, 171 died (28.8%), 146 patients (5.0%) had renal dysfunction, of whom 45 (27.1%) died. In a series of 22,791 Nigerian patients admitted over a 3-year period,²⁴ cardiovascular disease accounted for 25.2% of the 18,187 non-traumatic deaths. Of 139 patients admitted in our series for stroke, 58 (41.7%) died. In a study conducted in Dakar (Senegal), the 1-month mortality rate of ischemic stroke was 38% and that of hemorrhagic stroke was 56%.

patients.^{22,23}, the risk of death was significantly higher in patients with chronic kidney disease. In a meta-analysis of four community-based studies in the United States, chronic kidney disease (defined as a creatinine clearance of 15-60 ml/min/1.73 m²) had a prevalence of 7.4%. It was an independent predictor of the composite outcome of myocardial infarction, fatal coronary heart disease, stroke, and death, with a hazard ratio of 1.19 (95% confidence interval: 1.07-1.32). Furthermore, the risk was significantly higher in blacks than in whites (hazard ratios: 1.76 (1.35-2.31) versus 1.13 (1.02-1.26)).²³ With regard to cerebrovascular complications, stroke is a tragedy in the city of Goma due to the lack of well-equipped imaging services and neurosurgeons capable of intervening in emergency cases of stroke, which results in death. Stroke accounted for 35.9% of the admission diagnoses of deceased patients. Our results are similar to other African studies; of 3,317 acute medical admissions to a teaching hospital in Ghana,²⁰ 593 (17.9%) were due to cardiovascular disease, mainly hypertension, heart failure, or stroke. Of these patients, 171 died (28.8%), 146 patients (5.0%) had renal dysfunction, of whom 45 (27.1%) died. In a series of 22,791 Nigerian patients admitted over a 3-year period,²⁴ cardiovascular disease accounted for 25.2% of the 18,187 non-traumatic deaths. Of 139 patients admitted in our series for stroke, 58 (41.7%) died. In a study conducted in Dakar (Senegal), the 1-month mortality rate of ischemic stroke was 38% and that of hemorrhagic stroke was 56%.

The interpretation of the results of this study must take into account certain limitations. Firstly, because the study is cross-sectional, it prevents the establishment of any relationship between the results and the associated factors. Secondly, the data collection was done by documentary analysis where not all the information was available due to poor medical record keeping. Another limitation of this study was the inability to assess certain factors, for example, education level, marital status, anthropometric parameters, clinical features, and laboratory investigations, which would have been associated with mortality. The future study should include these variables.

Conclusion

Hospitalization for hypertension-related complications is common in Goma, with a mortality of 32.43%. Heart failure, chronic renal failure, and cerebrovascular complications were associated with mortality. These results underline that screening and treatment of hypertension and prevention of cardiovascular disease should be much higher on the political agenda in DRC, particularly in Goma.

Data availability

The datasheet used to support the findings of this study are available from the corresponding author upon request.

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Competing interests

The authors declare that they have no competing interests.

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