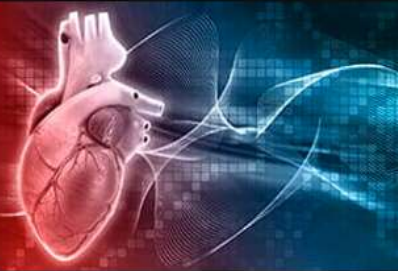


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Cardiovascular emergencies in N'Djamena: Epidemiological, clinical and evolutionary profiles

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Abstract

Introduction: Cardiovascular emergencies are a major cause of morbidity and mortality worldwide, with a disproportionate impact in developing countries. The objective of this study was to determine the prevalence of cardiovascular emergencies, to describe different nosologically groups and to specify the evolutionary modalities.

Patient and methods: This was a multicenter cross-sectional study conducted over 12 months in the medical emergency and cardiology departments of the Renaissance Teaching Hospital Center and the National Reference Teaching Hospital of N'Djamena. All patients admitted for a cardiovascular emergency during the study period were consecutively included.

Results: The overall prevalence of cardiovascular emergencies was 3.2%. The mean age of patients was 54.7 years \pm 16.2 years. There was a male predominance (58.3%) with a sex ratio of 1.4 and 78.3% of patients were married. Hypertension was known in 20% of patients and was the predominant cardiovascular risk factor in 59.6% of cases. Stroke (38.7%), acute pulmonary oedema (36.1%) and acute coronary syndromes (10.4%) were the most frequently encountered clinical presentations of cardiovascular emergencies. The most used mode of transportation by our patients for getting to medical emergencies were personal vehicles (35.7%) and city taxis (23.9%). The mean time symptom onset to hospital arrival was 23.6 days \pm 17.6 days. The average length of stay was 10.7 days \pm 6.2 days. The favorable rate of evolution was 75.2% and the recorded mortality was 18.7%.

Conclusion: Prevalence of cardiovascular emergencies is high in our context. The most affected population is young adults. Hypertension plays a major role in this. Stroke is the most common cardiovascular emergencies. Mortality is still high. We need to introduce universal health insurance and develop pre-hospital medicine.

Keywords: Cardiovascular emergencies, prevalence, N'Djamena, Chad

Introduction

Cardiovascular emergencies (CVEs) are a major cause of morbidity and mortality worldwide, but there are significant differences between different regions of the world, especially between industrialized and developing countries^[1-4]. Estimated 17.7 million deaths are attributable to cardiovascular disease, or 31% of total global mortality. Of these deaths, 7.4 million are due to coronary heart disease and 6.7 million to stroke^[5]. In sub-Saharan Africa, their prevalence and importance are still poorly understood. But all agree that CVEs are an increasingly common medical condition in medical emergencies^[1, 6, 7]. Taking care of them is a real challenge in our context marked by the precariousness of therapeutic facilities. Very few patients in our countries have access to efficient healthcare facilities, yet it is well established that early treatment significantly reduces complications and therefore mortality. In Chad, few studies have been carried out on this topic. Hence the interest of this work, the aim of which was to determine the prevalence of CVEs, to describe

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different nosologically groups and to specify the evolutionary modalities.

Patient and Methods

This was a descriptive cross-sectional study, with prospective data collection, conducted over a one-year period from 01 July 2022 to 30 June 2023. The medical emergency and cardiology departments of the Renaissance Teaching Hospital (CHU-R) and the National Reference Teaching Hospital (CHU-RN) of N'Djamena served as a study framework. All patients of both sexes, aged at least 15 years, admitted for CVEs in the different wards, were included consecutively. Patients with incomplete and/or unusable medical records were not included in this study. The variables studied were socio demographic characteristics, cardiovascular risk factors, time to visit, means of transportation, clinical data, and comorbidities. The average length of stay and the changing arrangements were also recorded. A pre-established data collection sheet was used to record each patient's data. These forms were filled out by the doctors.

Data analysis

We entered patient's data using Microsoft Word and Excel 2016 and analyzed using SPSS.21 statistical software. Quantitative parameters were presented as means \pm standard deviations and qualitative parameters as percentages. Pearson's Chi² test was used for proportion comparison. When application conditions were not observed, Fisher's exact test was used. Student's T-test was used for comparison of two averages. The statistical significance threshold was $p < 0.05$.

Ethical Considerations

Patients' consent had been obtained. However, a patient's refusal to participate in the study did not affect his or her subsequent management. The confidentiality of the data collected had been guaranteed.

Results

During the study period, 14,174 patients were admitted to the various facilities (including 10,830 patients from the CHU-RN and 3,344 patients from the CHU-R). Of these, 460 patients had a CVE (3.2%). These were 308 patients (2.8%) from the CHU-RN and 152 patients from the CHU-R (4.5%). Male sex predominated in 58.3% of cases, i.e. a sex ratio of 1.4. The most represented age group was 60-79 years (43.3%; $n=199$). The mean age of patients was 54.7 ± 16.2 years [15; 94 years]. Most patients were married (78.3%). Educated patients accounted for 64.1% of whom 31.3% had a higher education. Housewives accounted for 28% of the study population. In this series, 72.6% of patients had an average socioeconomic level. Patients coming from the home predominated with 45.4% of cases (Table 1). In 59.6 percent of cases, patients were transferred to hospital by a vehicle and in 16.5 percent by medical ambulance (Table 2). We observed the highest admission rates between 8 A.M. and 2 P.M. with a peak of admission at 11 A.M. (9.4%) (Fig 1). The mean time symptom onset to hospital arrival was 23.6 days \pm 17.6 days [0.2; 90 days]. The general practitioner was the first emergency examiner in 56.1% of cases (Table 3). Hypertension was known in 20% of patients and was the most incriminated cardiovascular risk factor in 59.6%. Dyspnea (43.9%), chest pain (40.4%) and hemiplegia-like motor deficit (36.1%) were the main reasons for consultations. Figure 2 shows the different symptoms observed in our patients. The most frequently encountered CVEs clinical presentations were stroke (38.7%), acute pulmonary edema (36.1%) and acute coronary syndromes (10.4%). Table 4 summarizes the different CVEs encountered. The mean hospital stay was 10.7 ± 6.2 days [0; 53 days]. Three hundred and thirty-four (334) patients (72.6%) were discharged from hospital with the follow-up appointment and 30 patients (6.5%) were evacuated abroad for better management. The course of the patients resulted in death in 18.7% of cases (Table 5). The specific case fatality rates for stroke, OAP, and ACS were 20.8%, 19.3%, and 16.7%, respectively. Together, they accounted for 89.5% of fatal CVEs (Table 6).

Table 1: Distribution of Patients with Cardiovascular Urgency by Origin

Provenance	Effective (n)	Percentage (%)
Home	209	45,4
Private Clinic	65	14,1
Community Health Center	20	4,3
District Hospital	76	16,5
Provincial Hospital	46	10,0
Teaching Hospital	40	8,7
Others	4	0,9
Total	460	100,0

Table 2: Distribution of Patients by the mode of transportation used

Mode of transportation	Effective (n)	Percentage (%)
Personal vehicle	164	35,7
City Taxi	110	23,9
Simple ambulance	102	22,2
Medical ambulance	76	16,5
Motorcycle cab	8	1,7
Total	460	100,0

Table 3: Distribution of patients by examiner status on admission

Status	Effective (n)	Percentage (%)
General practitioner	258	56,1
Cardiologist	174	37,8
Emergency physician	14	3,0
Student	8	1,7
Intensive care anesthetist	4	0,9
Pulmonologist	2	0,4
Total	460	100,0

Table 4: Repartition of cardiovascular emergencies by gender

Cardiovascular emergencies	Total n(%)	Sexe		P
		Male n(%)	Female n(%)	
Stroke	178 (38,7)	102 (38,0)	76 (39,6)	<0,01
Acute Pulmonary Edema	166 (36,1)	96 (35,8)	70 (36,4)	0,04
Acute Coronary Syndrome	48 (10,4)	26 (9,7)	22 (11,4)	<0,01
Pulmonary Embolism	22 (4,8)	14 (5,2)	08 (4,2)	<0,01
Deep venous thrombosis	18 (3,9)	10 (3,7)	08 (4,2)	0,04
Hypertensive Emergency	14 (3,0)	10 (3,7)	04 (2,1)	-
Electric rhythm and conduction disorders	08 (1,7)	06 (2,2)	02 (1,0)	-
Endocarditis	04 (0,9)	02 (0,7)	02 (1,0)	-
Cardiac Tamponade	02 (0,4)	02 (0,7)	0 (0,0)	-
Total	460 (100)	268 (58,3)	192 (41,7)	

Table 5: Repartition of cardiovascular emergencies by age group

Cardiovascular emergencies	Total n (%)	Range age (years)			P
		20-49	50-69	≥70	
		n (%)	n (%)	n (%)	
Stroke	178 (38,7)	20 (20,8)	56 (24,7)	102 (74,4)	<0,01
Acute Pulmonary Edema	166 (36,1)	50 (52,1)	106 (46,7)	10 (7,3)	0,04
Acute Coronary Syndrome	48 (10,4)	14 (14,6)	27 (11,9)	07 (5,1)	<0,01
Pulmonary Embolism	22 (4,8)	02 (2,1)	14 (6,2)	06 (4,4)	<0,01
Deep Venous Thrombose	18 (3,9)	04 (4,2)	08 (3,5)	06 (4,4)	0,04
Hypertensive Emergency	14 (3,0)	02 (2,1)	09 (4,0)	03 (2,2)	0,04
Rhythm and conduction disorders	08 (1,7)	0 (0,0)	07 (3,0)	01 (0,7)	0,04
Endocarditis	04 (0,9)	02 (2,1)	0(0,0)	02 (1,5)	0,04
Cardiac tamponade	02 (0,4)	02 (2,1)	0(0,0)	0(0,00)	0,04
Total	460 (100)	96 (20,8)	227 (49,3)	137 (29,7)	

Table 6: Distribution of patients according to cardiovascular emergencies and according to evolutionary modalities

Cardiovascular emergencies	Total n(%)	Evolutionary modalities		
		Positive trend	Resuscitation admission	Death
		n(%)	n(%)	n(%)
Stroke	178 (38,7)	136 (39,3)	05 (17,9)	37 (43,0)
Acute Pulmonary Edema	166 (36,1)	126 (36,4)	08 (28,6)	32 (37,2)
Acute Coronary Syndrome	48 (10,4)	35 (10,1)	05 (17,9)	08 (9,3)
Pulmonary embolism	22 (4,8)	12 (3,4)	06 (21,4)	04 (4,6)
Deep Venous Thrombosis	18 (3,9)	18 (5,2)	0 (0,0)	0 (0,0)
Hypertensive Emergency	14 (3,0)	08 (2,3)	04 (14,3)	02 (2,3)
Electric Rhythm and conduction disorders	08 (1,7)	06 (1,7)	0 (0,0)	02 (2,3)
Endocarditis	04 (0,9)	04 (1,2)	0 (0,0)	0 (0,0)
Cardiac tamponade	02 (0,4)	01 (0,3)	0 (0,0)	01 (1,2)
Total	460 (100)	346 (75,2)	28 (6,1)	86 (18,7)

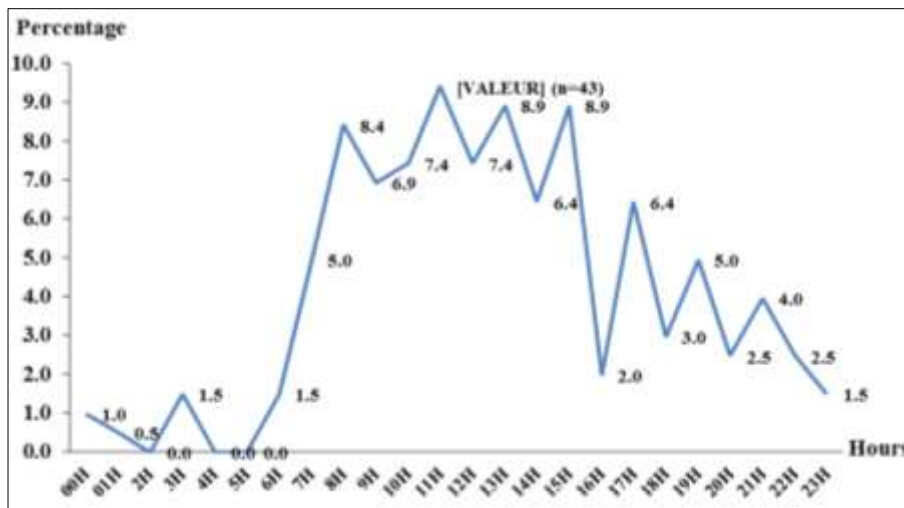


Fig 1: Cardiovascular emergency department admission curve by schedule

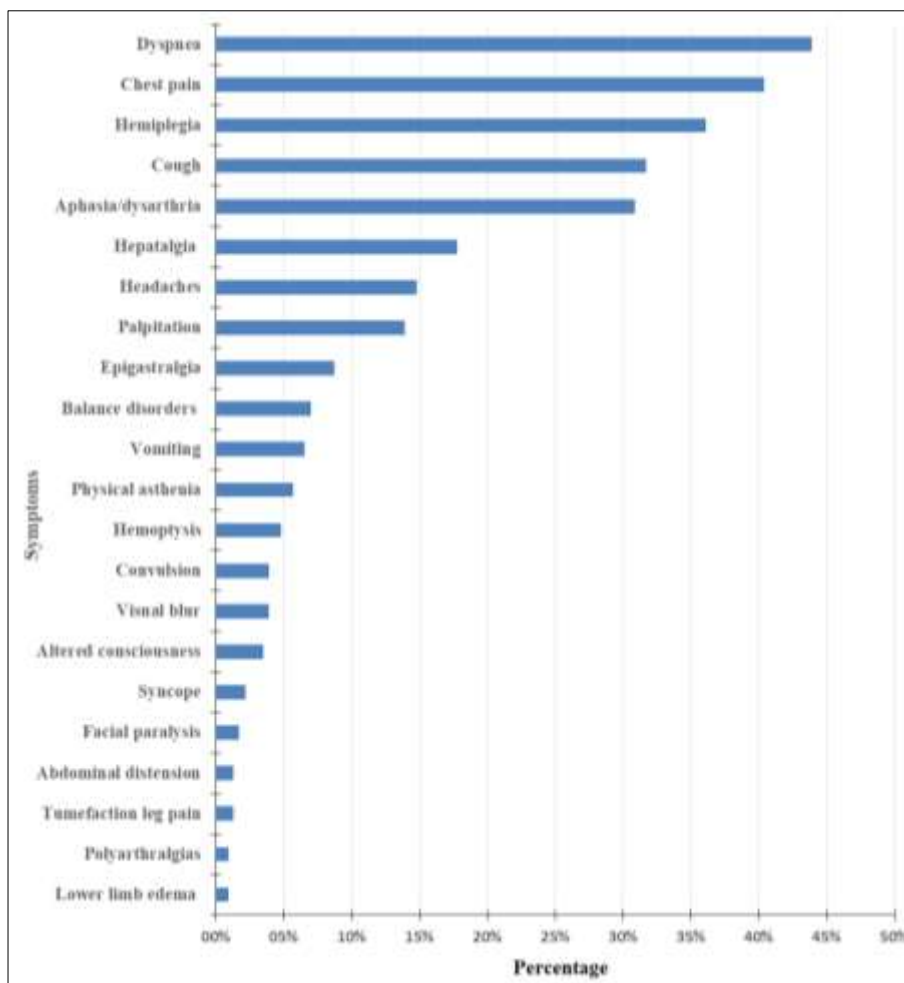


Fig 2: Distribution of patients by reason for consultation

Discussion

This study, the first on cardiovascular emergencies in Chad, has made it possible to clarify the epidemiology of CVEs, but also to provide important information on the socio demographic profile of patients with CVEs, as well as the main nosologically groups encountered in our context. This could guide policymakers in choosing priorities and strategies to improve population health.

During our study, the combined hospital prevalence of CVEs was estimated to be 3.2% of all admissions. This prevalence was comparable to those found by Hamadou *et*

al. in Cameroon [8] and Gombet *et al.* in Congo Brazzaville [6] which reported 4.7% and 7% respectively. These prevalences of CVEs in our contexts are probably underestimated. Indeed, the inaccessibility of specialized care structures, the low socio-economic level of patients associated with the lack of universal health coverage, the severity of the clinical pictures and the absence of a system of pre-hospital management of vital emergencies explain why a large proportion of patients with CVEs do not reach care structures. This finding raises a real public health problem regarding the management of CVEs in our

developing countries. The introduction of universal medical insurance is essential to make quality care accessible to most of the population. This would help reduce the gap between rich and poor in the face of the disease.

The characteristics of patients with CVE are little different from those described in the African literature [1, 3, 4, 9-11]. CVEs affect a younger population (average age 54.7 years), predominantly male (58.3%) and with an unfavorable socio-economic status. In contrast, in developed countries, the average age of patients admitted for CVE is higher. It was 65 years old in the series of Marcolino *et al.* in Brazil [12]. This difference in age compared to those in developing countries could be explained by their higher standard of living and better access to medical care, which allows cardiovascular diseases to be controlled for a long time.

In 59.6% of cases, the transfer of patients to the hospital was carried out by used vehicles and in 16.5% it was a medical transfer by ambulance. Diop *et al.* in Mali noted that taxis were the most common mode of transport to hospital, at 71.2% [10]. For Essola *et al.* in Gabon, only 20.6% of patients were transported by medical ambulance [13]. These results illustrate the lack of a reference mode of transport for emergencies in Africa, in particular the Emergency Medical Aid Service (EMAS). EMAS that has proven its effectiveness in the management of CVEs in developed countries. These figures highlight the still glaring inadequacies of pre-hospital management of life-saving emergencies in our context.

The mean time symptom onset to the hospital arrival in our study was 23.6 ± 17.6 days [0.2; 90 days]. This confirms the long average consultation time (36.7 days) already reported by Naibe and al. in 2016 in their series on the burden of cardiovascular disease in Chad [14]. Unlike in European countries, in Chad as in most countries south of the Sahara [1, 10], the admission time is still very long, whereas to date, CVEs must be a real race against time. The delay in consultation is said to be due not only to a lack of financial resources, but also to socio-cultural considerations that give an important place to traditional therapy. The poor organization of the care pathway and the lack of knowledge of health professionals about CVEs also contribute to longer delays.

High blood pressure was the most common cardiovascular risk factor accounted for 59.6%. This predominance of hypertension as a risk factor is widely found in the literature. For Naibe *et al.* in Chad, hypertension was noted in 55% of patients [14]. This result is close to that reported by Diop *et al.* in Mali in 2018 with 54% [10]. This situation would reflect a delay in the diagnosis and management of hypertensive patients.

The most frequently encountered CVEs were stroke (38.7%), acute pulmonary edema (36.1%) and acute coronary syndromes (ACS) (10.4%). Regarding the prevalence of strokes, this result is similar to that of Mboliassa *et al.* in Congo Kinshasa in 2015 [15] with 50.8% and Gombet *et al.* in Congo Brazzaville in 2007 [6] with 44.5% of cases. While Cheval *et al.* in 2009 reported that ACS was the main emergency among men in the Rescue network [16]. In our study, we also noted the relatively low prevalence of ACS in Africa, as already mentioned by Bertrand *et al.* in 2006 in a study of seven sub-Saharan African countries. [1]. However, this prevalence may be underestimated because in the absence of exercise ECG and biological assay of myocardial necrosis markers, unstable angina and ACS with under shifts are underdiagnosed. What's more, patients suffering from severe forms of ACS

die before they reach hospital. This also contributes to the underestimation of this prevalence.

In our study, in-hospital mortality was 18.7% in our study. This result corroborates data from the African literature, where CVE mortality in the range of 15 to 30% was reported [1, 9, 10]. This dreadful prognosis in our context could be explained by the seriousness of the clinical pictures at the time of diagnosis and the inadequacy of our therapeutic platform. Low socio-economic status for most of our patients, and above all the lack of social security, exacerbate all these factors.

Conclusion

The prevalence of CVEs is high in our context. The most affected population is young adults. Hypertension plays a major role in this. Stroke is the most common CVEs. Mortality is still high. The establishment of universal health insurance as well as the development of pre-hospital

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Competing interest

The authors declare that they have no competing interest.

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