

Hypertensives Crises in two References Hospitals in Yaoundé: Clinical Profile and Short Term Outcome: A Prospective Cohort Study



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Abstract

Objective: To describe the clinical profile and short-term outcome of patients with hypertensive crisis attending medical emergency units at the Yaoundé Central Hospital and Yaoundé Emergency Center.

Methods: We conducted a prospective cohort study at the Yaoundé Central Hospital (YCH) from January to February 2020 and at Yaoundé Emergency Center (YEC) from February to March 2020. We screened all patients coming for medical emergencies. Patients with SBP ≥ 180 mmHg and/ or Diastolic BP ≥ 120 mmHg who consented were included in the study. We collected sociodemographic data from participants, past medical history and we did a thorough clinical evaluation. Systematic laboratory test such as urea, creatinine, serum electrolytes and full blood count were done and when necessary supplementary workup were done to confirm diagnosis. Patients were then classified as hypertensive emergencies if there was presence of at least one target organ damage or hypertensive urgencies if no acute target organ damage was found. They were then followed up for one month to evaluate their short term outcome.

Results: We enrolled 164 participants accounting for a prevalence of 11.5% of all medical emergencies admissions. We had 130 (79.3%) hypertensive emergencies (HE) and 20.7% hypertensive urgencies (HU). We did not note any significant difference in age, gender, SBP/DBP and cardiovascular risk factors between the two groups. Strokes were the most present organ damage occurring in 67.7% of patients, followed by heart damage in 26.2% cases. We had a survival rate of 85.4% after 72hrs follow up. One month mortality rate was of 31.1%. No patient in the HU group died. After multivariate analysis, GCS ≤ 12 and haemorrhagic strokes were the two conditions affecting death. Participants with GCS ≥ 12 had a greater chance of surviving.

Conclusion: Hypertensive crisis are frequent in our milieu, they are associated to significant morbidity and mortality.

Keywords: Hypertensive crises; Short-term outcome; Yaoundé

Introduction

Hypertensive crises (HC) are defined as acute severe elevation of Systolic Blood Pressure (SBP) ≥ 180 mmHg and/or Diastolic Blood Pressure (DBP) ≥ 120 mmHg and can either be urgencies (if no target organ damage) or emergencies (if presence of acute target organ damage). Hypertension is one of the major chronic diseases in the world with an estimated prevalence in the adult population of about 26%, or about 1.28 billion people [1]. According to the WHO, 1 to 2% of hypertensive

patients will experience a hypertensive emergency [2]. It is the main cardiovascular emergency in sub-Saharan Africa [3], given the exponential increase in the incidence of hypertension in Africa with the epidemiological transition and the absence of a cardiovascular disease prevention policy [4]. In Cameroon the prevalence of hypertension in the urban population is 29.7% [5], its complications represent by far the 1st cause of hospitalisation in cardiology departments, with a significant morbi-mortality [6]; morbi-mortality theoretically higher in the case of an acute

elevation of blood pressure figures, with a vital prognosis directly involved. However, few studies report on the epidemiology of hypertensive emergencies and the prognosis of patients. Given the scarcity of data on hypertensive emergencies in our milieu, we decided to conduct a study on the epidemiological and clinical aspects of patients presenting with hypertensive emergencies in the city of Yaounde, and their short-term prognosis. Our study could be an added value in the primary and secondary prevention of hypertensive patients.

Methods

We carried out prospective cohort study in two reference hospitals in Yaoundé, the Yaoundé Emergency Center (YEC), and the Yaoundé Central hospital, (YCH), The study was carried out over a 4 months period from 01 January 2020 to 31 April 2020.

All patients over 18 years old admitted to the emergency room of YEC and presenting with acute elevation SBP \geq 180mmHg and /or DBP \geq 120mmHg YCH were included. Patients who cannot be followed for more than one month and pregnant women were excluded.

For each participant, we collected sociodemographic data (age, gender...), history of hypertension and its treatment, use of drugs (cocaine, non-steroidal anti-inflammatory drugs, corticosteroids), presence of any chronic disease, cardiovascular risk factors (smoking, alcohol abuse, family history of cardiovascular events). We performed a physical examination. Laboratory test such as renal function test, full blood count, serum electrolytes were routinely done and others such as troponin, and imaging workups; computed tomography, 12 lead electrocardiography and ultrasound done when indicated. We recorded their treatment. Each patient was followed up for a one-month period to record short-term morbidity mortality data. Home visits and when impossible phone calls were used to get this information from patients discharged.

The protocol and questionnaire was submitted to the Ethical Committee of The Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I and the National Ethic Committee for ethical evaluation and approval.

Opérationnel definition of terms

Hypertensive crises (HC): are defined as acute severe elevation of Systolic Blood Pressure (SBP) \geq 180mmHg and/or Diastolic Blood Pressure (DBP) BP \geq 120mmHg.

Urgencies: are defined as acute severe elevation of Systolic Blood Pressure (SBP) \geq 180mmHg and/or Diastolic Blood Pressure (DBP) BP \geq 120mmHg we no target organ damage.

Emergencies: are defined as acute severe elevation of Systolic Blood Pressure (SBP) \geq 180mmHg and/or Diastolic Blood Pressure (DBP) BP \geq 120mmHg with presence of acute target organ damage.

Acute target organ damage: damage to one of the target organs (brain, heart, kidney, aorta, retina, placenta) affected by acute severe elevation of BP

Predictors of death or poor prognostic factors: these are variables that influence independent variable death. They were chosen based from past studies and tendencies observed during study period. The variable with the highest statistical significance was then used in drawing Kaplan Meier survival probability curve.

Measurements

Blood pressure: was measured on admission with a digital vital signs monitor (Philips sure sign VS2+) at the YEC and Automatic blood pressure monitor (OMRON™) at the YCH both available for routine care in the triage area of the ED in the sitting position and in the supine position depending on weather the patient could sit or not. For patients with high BP on initial screening, a second BP was taken using an aneroid sphygmomanometer in both hospitals.

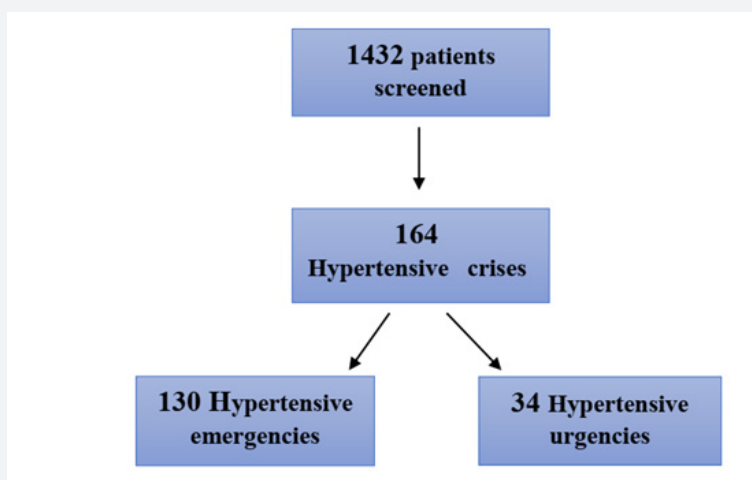


Figure 1: Flow Chart.

Results

During the screening period, 626 patients were admitted into the Yaoundé Central Hospital's emergency unit and 806 in the Yaoundé Emergency Center, making a total of 1432 patients screened. All patients gave their consent and no patient was lost during the follow up period. Among the 164 patients with HC, 130 (79.3%) had HE and 34 (21.7%) Figure 1.

frequency of hypertensive crises

Among these 1432 admitted in the emergency units patients, 164 had HC making a prevalence of 11.5% among all medical admissions in the emergency unit.

Sociodemographic characteristics of the study population

Of the 164 participants, we had a total of 83 (50,6%) males and 81 (49,4%) females, giving a sex ratio of approximately 1. In the HE group, we had more men 69 Men (53.1%) while in the HU we had more Women 20 (58.8%). The mean age of the study population was 58.1 ± 13.1 years (extremes 23- 93 years). The mean age for the participants in the HE group was 60.1 ± 13.1 years and were significantly older than patients in the HU group, 54.5 ± 12 years ($p=0.03$). The [46 - 60] age group was the most represented. In both groups, most of the patients were married 119 (72.6%) and had attained the Secondary level of education.

Clinical characteristics

Cardiovascular risk factors

In our study population, 138 (84.1%) were more than 45years old. Family history of hypertension or cardiovascular disease or event was remarkable for 112 participants (68.3%). Regular alcohol consumption was reported in 42.7% participants with 26.2% consuming more than the normal daily requirements. Twenty (12.2%) participants were current tobacco smokers or had stopped < 3yrs ago while 21.43% declared to have smoked but stopped > 3yrs ago. Twenty five participants (18.6%) were already known with diabetes and an additional 18 were diagnosed with diabetes during the study period, giving a total of 43 (26.2%) diabetic patients in our study population. Majority of the participants, 126 (76.8%) were not practicing any physical exercise, nor had an occupation that permit them to be physically active. Those who indeed practice regular physical exercise did so moderately. Sixty-eight (41.5%) participants were obese. There was no statically significant difference between the group of HE and HU as concerns cardiovascular risk factors.

Most of the participants 109 (66.5%) had been previously diagnosed with hypertension, 87 (66.9%) in the HE group and 22 (64.7%) in the HU group. There was no significant difference, p -value=0.81.

Twenty-eight (25.7%) participants reported a past history of Hypertensive crises: 24 (27.6%) in the HE group and 4 (18.2%)

in the HU group with four participants reporting 2-3 episodes of hypertensive crises in their past history. Sixty-six, 66 (60.6%) of participants were on antihypertensive medications at the time of the screening. There was a statically significant difference, (p value = 0.025) between those on treatment in the HU group, when compared to those on treatment in the HE group.

Medication History

Among those on antihypertensive medication, 26 (39.4%) had a poor compliance to medication while 24 (36.4%) had a good compliance. In the HE group, majority had a poor compliance 20 (41.7%) as oppose to the HU group, majority had a good compliance (38.9%) had a good compliance. However, this difference was not statically significant between the two groups. As regards to previous medication drug combination, 31 (47.0%) were under one drug combination, 24 (50.0%) in the HE group and 7 (38.9%) in the HU group and no statically significant difference between the two groups. Eight patients, 8 (12.1%) declared to abruptly stopped medication few days before crisis, 4 (8.3%) in the HE group 4 (22.2%) in the HU group, with 3 abruptly stopping B-Blockers. There wasn't any significant difference.

Clinical presentation and Laboratory Findings

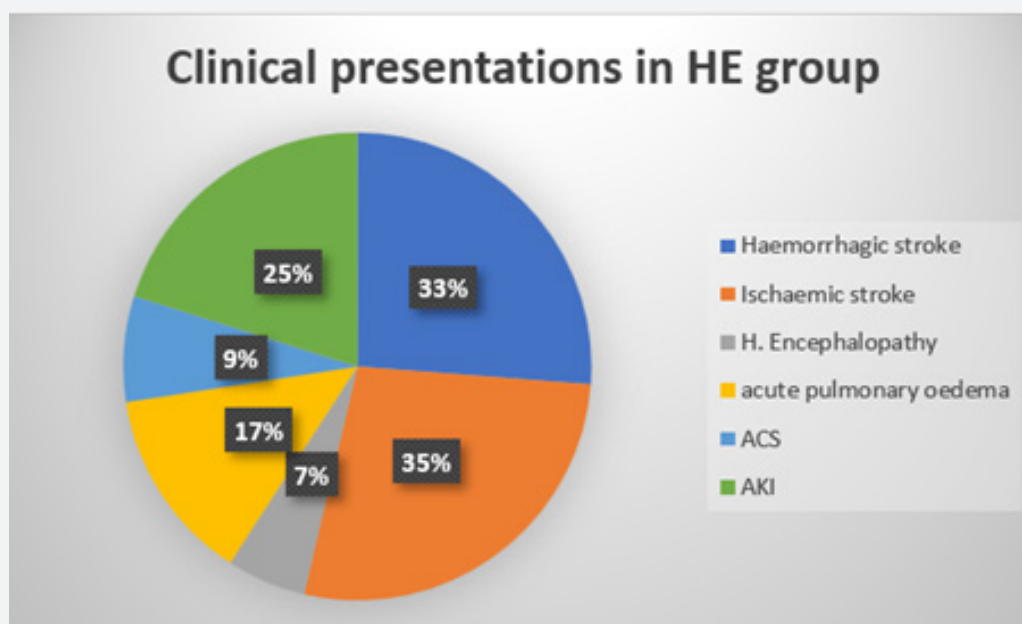
Focal neurological signs and severe headache were the most common clinical findings accounting for 46.6% and 26.3% respectively and closely followed by AMS. In the HU group, severe headache (47.1%) was the most present clinical finding followed by dizziness (23.5%).

The Mean Systolic and Diastolic BP of the study population were respectively 204.32 ± 24.95 mmHg and 119.70 ± 19.98 mmHg. The mean BMI in the study population was 28.36 ± 5.57 kg/m². In the HE it was 28.33 ± 8.76 kg/m² and 28.43 ± 4.84 kg/m² in the HU group. The mean average GCS was 12.68 ± 2.99 in the study population: 12.12 ± 3.08 in the HE group while all patients in the HU group had a GCS of 15. There was no significant difference as regards clinical parameters.

Among the 130 participants in the Hypertensive emergencies group, Ischaemic and Haemorrhagic cerebrovascular accidents were the most common diagnosis (Figure 2) accounting 34.6% and 33.1% respectively. Acute Coronary Syndrome and Hypertensive Encephalopathy were the least represented accounting for 6.9% each.

Laboratory findings

The mean uremia value was significantly higher in the HE group than that of the HU group, 0.42 ± 0.37 g/L vs. 0.28 ± 0.09 g/L with P -value<0.05. We had a mean estimated Glomerular Filtration Rate, eGFR and mean haemoglobin value that were significantly lower in the HE group than that of the HU group, 70.56 ± 23.5 vs. 94.46 ± 24.6 and 12.11 ± 1.71 g/dl vs. 13.24 ± 1.27 g/dl respectively.



ACS = acute coronary syndrome, AKI=acute kidney injury

Figure 2: Clinical presentations in HE group.

Management

One hundred and thirty-three participants (81.1%) were managed with IV Nicardipine initially: 110 (84.6%) in the HE group and 23 (67.7%) in the HU group. Those in the HE group that did not benefit from Nicardipine were mostly patients with ischemic stroke whose BPs were not very high. This was then switched to oral drugs, with CCBs being the most commonly used oral drug (73.2%) followed by Thiazide diuretics (48.2%) Most patients were on bi therapy (62.8%) for oral relay. There wasn't any significant difference in treatment between the 2 groups.

Short term Morbidity, Mortality Rate and Predictors of death

The Mean duration of hospitalization was 6.07 ± 5.45 days for the study population. The mean duration of Hospitalisation in the HE group (7.14 ± 5.64) was significantly higher than that of the HU group, 1.97 ± 0.937 (P-value<0.001).

a) Morbidity

After 72hrs follow-up, they were 2 cases of reoccurrence in the HE group. After 1 month follow-up, we had 7 cases of reoccurrence (three cases of HU, one case of ischaemic stroke, one case of haemorrhagic stroke, one case of pulmonary oedema and one case of acute coronary syndrome). Five participants were programmed for dialysis, all in the HE group.

b) Mortality Rate

We had a Mortality rate of 24 (14.6%) over 72rs follow-up. in the study population. Among those deceased after 72hrs, 58% had a Haemorrhagic stroke involvement. One month later we had 27 more deaths, making 16.6% mortality rate between 72hrs and one month (Figure 3, 4).

f34

c) Predictors of higher mortality rate

To determine factors influencing higher mortality, we performed a univariate analysis which revealed that age ≥ 70 yrs, Ischaemic Stroke, Haemorrhagic Stroke, Obesity, $GCS \leq 12$, were associated with a higher mortality rate with p-values <0.0001. Using a multivariate analysis, haemorrhagic Stroke and $GCS \leq 12$ were strongly associated with higher mortality with p-value =0.03 and <0.0001 respectively. Using the most statically significant variable, $GCS \leq 12$ in evaluating survival probability, we note that, out of the 106 participants with a $GCS > 12$, 94 survived giving a survival probability of about 89%, as indicated on the graph. On the other hand only 19 out of the 58 participants in the $GCS \leq 12$ survived giving a survival probability of about 33%. The survival probability was much higher in the Glasgow Coma Score (GCS) group of >12 , than in the group of $GCS \leq 12$, (Figure 5). Therefore, individuals with a $GCS > 12$ had a greater survival advantage with a p-value <0.0001.

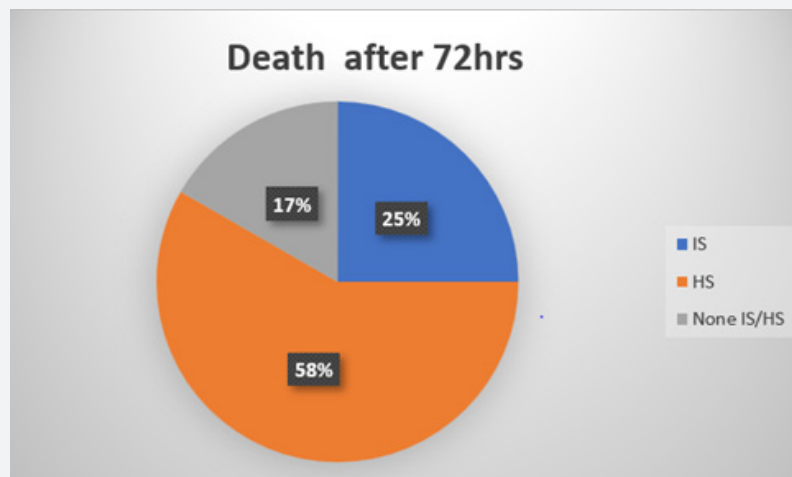


Figure 3: Presence of Haemorrhagic/ Ischaemic stroke or not among 72hrs deceased.

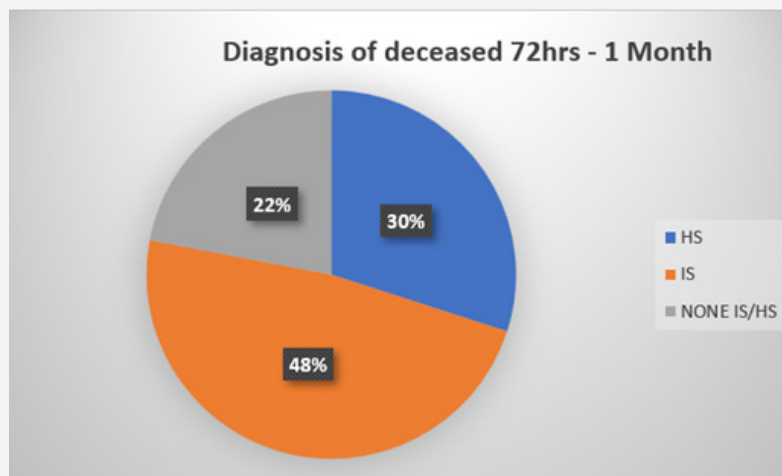


Figure 4: Presence of Haemorrhagic/ Ischaemic stroke or not among 72hrs - 1 Month deceased.

Discussion

Study limitations

a) The COVID-19 Pandemic led to a readjustment in the different departments in our recruitment sites so as to accommodate COVID-19 patients, making recruitment less evident and patients reluctant to participate in studies. Also the presence of COVID-19 patients resulted to a drastically low patient turn in hospitals accommodating COVID-19 patients.

b) The short duration of study. It had to be shortened so as not to get biased results since only extreme cases now came to our recruitment sites.

c) We carried out our studies in 2 reference hospitals in Yaoundé with high patient turn over. These results may therefore not represent the prevalence of HC nationwide.

d) Fundus oculi was not performed for the diagnosis of malignant hypertension.

Epidemiology of hypertensive emergencies

The prevalence of hypertensive emergencies was 11.5%. Results close to the 13.2% found by Mandi, et al. [7] in 2016 in the medical emergency department of the Yalgado Ouédraogo University Hospital, Ouagadougou, [7]. Nkoke et al. [8] in a study on hypertensive emergencies carried out in 2018 at the Buea Regional Hospital found a prevalence of 6.2% [8]. This difference can be explained by the difference of the recruitment services. Ours was conducted in an emergency department where we met both HE and HU, as opposed to an inpatient department where we practically only met HE, as HU are not in theory hospitalised. The prevalence of HC in sub-Saharan Africa still remains high compared to developed countries [9,10]. This could be explained

by a higher prevalence of Hypertension in our milieu [1]. Blacks are more predisposed to severe Hypertension and HC. Shea, et al. [11] explained that this difference could be due to poor health systems (lack of routine screening, Health Insurance and poor access to health personnel [11]). A low socioeconomic level could also explain this difference. We had a mean Age of 58.1 ± 13.1 years (extremes 23- 93 years). The mean age of the HE group was significantly higher than that of the HU group, (60.1 ± 13.1 vs. 54.5 ± 12 , $p=0,031$), resultat similaire à Guiga et al. [12] qui retrouvaient une moyenne d'âge plus élevé chez les patients présentant une emergencies comparativement au urgencies.

Alshami A, et al. [13] in their study 'Management of hypertensive crises in the elderly' found out that elderly patients are more likely to have hypertensive emergencies, rather than urgencies, than the general population [13].

A great number of participants were Unemployed, 72 (43.9%). This could be accounted for by the fact many of the participants were very old and had reached retirement age. Also severe hypertension is reportedly more common in people with a lower socioeconomic level due to lack of routine medical checkups, inability to purchase monthly medication and lack of insurance systems [11].

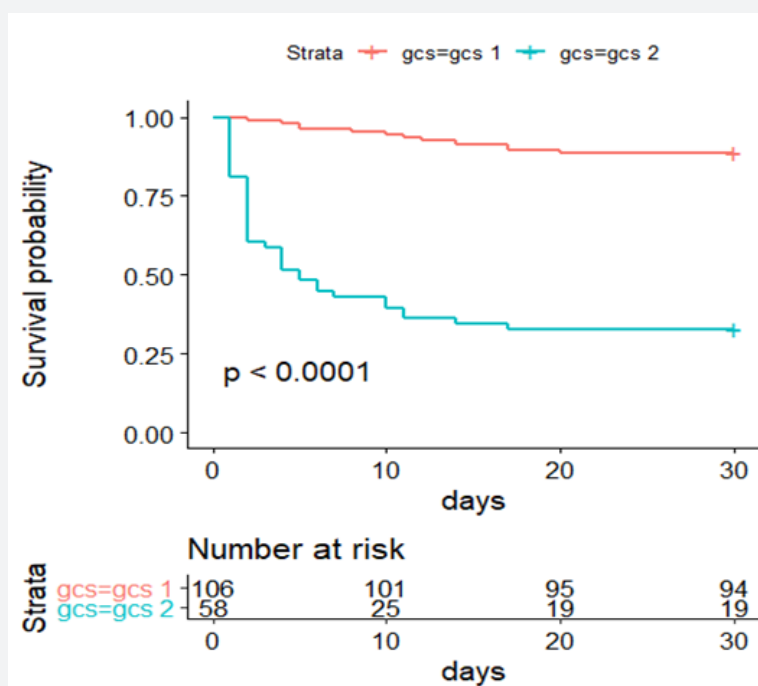


Figure 5: Kaplan Meier survival curve.

Key: gcs1: GCS> 12

gcs2: GCS≤12

Clinical profil of patients

Among the 164 participants, we had a higher prevalence of Hypertensive emergencies, 79.3% compared to Hypertensive urgencies, 20.7%. The predominance of HE is also found in several series [7,14]. This can be explained by the fact that our recruitment was carried out in emergency departments; the more serious clinical picture with acute failure of the target organs imposes from the outset a consultation in the medical emergencies contrary to the HU dominated by the neurosensory signs of Dieulafoy which will be seen of advantage in external consultation.

Most of our patients, 66.5% had been diagnosed of hypertension prior to their hypertensive crisis. This is similar

to the 60.8% that Mandi et al. [7] reported in Burkina. However results reported from developed counties were higher, ranging from 75-88.1% [12,15]. This is due to the lack of preventive medicine for the primary prevention of cardiovascular diseases in our context [4]. Patients in the developed world often present themselves for regular checkups. This increases the chances of early diagnosis while those in the underdeveloped rarely present to their health care providers for regular checkups.

Among the known hypertensive, 60.6% were currently on antihypertensive medication, compared to 91% in a French study [15]. This poor adherence and compliance to treatment in our study is due to the socio-economic difficulties highlighted above. Ngongang Ouakou, et al. [15] on a study of severe hypertensive patients in urban Cameroon also underlined socio-anthropological

factors as there was always a high drop-out rate despite the treatments and the follow-up provided free of charge [16].

In our study, the most frequent end organ damage was the brain presenting as stroke, 67.7 %, with both forms almost equally present. These results are not too different from the 61.1% of strokes that Mandi et al. [7] reported and similar to the majority of other studies [13,15,15]. This is due to the fact that high blood pressure is the greatest risk factor for stroke. The preponderance of focal neurological deficit as a functional sign is due to the fact that more strokes were found in our study population [16].

Laboraty findings

We observed a significant difference in haemoglobin, uremia and eGFR between the HE and HU groups. It has been reported in literature that high BP leads to high vascular reactivity and the release of critical levels of vasoactive agents such as norepinephrine, angiotensin II, and vasopressin leading to natriuresis, then hypovolemia which further triggers release of the vasoconstrictive agents. This brings about arteriolar fibroid necrosis which precipitates endothelial damage followed by platelet deposition and release of thromboxane which can result in a microangiopathic haemolytic anaemia [17]. This explains why patients in the HU group turn to have a higher haemoglobin value since they don't attain the point of fibroid necrosis. In a study carried out by Derhaschnig U, et al. [17], [18] which aimed at comparing renal function between patients with HE, patients with urgencies and normotensive controls, the investigators evaluated the earliest biomarker of kidney injury, neutrophil gelatinase-associated lipocalin (NGAL), Creatinine, blood urea nitrogen (BUN), and cystatin C and estimated glomerular filtration rate was calculated (eGFR). Creatinine and BUN were significantly higher and eGFR was significantly lower in Hypertensive emergencies as compared with urgencies or controls ($P < 0.01$). Similarly, cystatin C and NGAL levels were significantly higher in emergencies compared with the other groups ($P < 0.001$). Similar findings were also reported by other studies [7,8,14].

Management

The management of HE vs. HU still remains complex and varies greatly with hospital settings despite standard recommendations. It is however recommended to lower BP in HU slowly with the use of oral antihypertensive drugs. In our study all patients coming with SBP ≥ 220 mmHg and or DBP ≥ 120 mmHg were systematically placed on a drug regimen to rapidly reduce the BP with strict control before further investigation to rule out a HE.

The drug mainly used in rapid BP reduction was Intravenous Nicardipine. Nicardipine has been proven to be efficient in the management of HE in general [19] and also in the elderly [13]. Relayed was done with oral antihypertensive drugs with the most used being CCB and thiazide Diuretics. Blood pressure was well controlled under these drug regimens but recovery from target

organ damage was more complicated. This could be due to the small capacities of intensive care units in our context. We note that at the end of the study most patients were placed on two drug regimen 62.8% compared to the on drug regimen 47.0% patients reported at the beginning of study.

Mortality rate and factors predicting mortality

All deaths recorded in our studies were those in the HE group. We had a high mortality rate of 14.6% in the 72-hours period following hospitalization. At the end of the one month follow up period, we had a 31.1% mortality rate. The hospital mortality rate of hypertensive crises in sub-Saharan Africa as reported by studies varies 19.2 to 22.2% [7,14].

Predictors of mortality

After multivariate analysis, Haemorrhagic stroke (p -value =0.03) and Glasgow Coma Score (GCS) ≤ 12 , (p -value < 0.0001) were found to be predictors of death. Using univariate analysis, Age ≥ 70 years, Ischaemic stroke, Haemorrhagic stroke, obesity, GCS ≤ 12 , were significant predictors of death (**p -value < 0.0001 , 95% CI**) Generally, cerebrovascular accidents (stroke) are the second leading cause of death globally [20]. This could also account for its high mortality rate during hypertensive emergencies.

Haemorrhagic stroke on the other hand has a poor prognosis especially when it is associated with intraventricular bleeding, ventricular Herniation and hydrocephalus as it easily plunges a patient into Coma and hence a low GCS. Most at times patients with this form of complicated Haemorrhagic stroke have passed indications for surgery and have poor prognosis, and this was the case of most of our patients who had a poor outcome.

Our high mortality rate is surely due to our higher prevalence of strokes compared to other studies. Also we had an older population and hypertension is more common in this group as well as has a higher mortality and morbidity [21].

Conclusion

Hypertensive crisis are highly prevalent among medical emergencies. Strokes represent the most frequent clinical presentations with Haemorrhagic stroke having the worst prognosis in the early hours. The majority of patients has poor compliance to their antihypertensive drug regimen while a considerable number are not even aware of their diagnosis of hypertension prior to HC. The mortality rate of HC is very high in our context compared to data reported in developed countries. A GCS ≤ 12 and haemorrhagic stroke and age are found to be the worst prognostic factors.

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