Clinical Neurology and Neuroscience
2023; 7(2): 38-45
http://www.sciencepublishinggroup.com/j/cnn
doi: 10.11648/j.cnn.20230702.13
ISSN: 2578-8922 (Print); ISSN: 2578-8930 (Online)

Stroke at University Teaching Hospital of Kara (Togo) in 2022: Epidemiological, Clinical, and Evolving Aspects

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To cite this article:

Agba Lehleng, Tcherou Tchaa, Djalogue Lihanimpo, Talabewi Abide, Anayo Nyinevi, Dagbe Massaga, Kumako Vinyo, Kombate Damelan, Assogba Komi, Balogou Agnon Ayelola. Stroke at University Teaching Hospital of Kara (Togo) in 2022: Epidemiological, Clinical, and Evolving Aspects. *Clinical Neurology and Neuroscience*. Vol. 7, No. 2, 2023, pp. 38-45. doi: 10.11648/j.cnn.20230702.13

Received: May 4, 2023; **Accepted**: July 5, 2023; **Published**: July 20, 2023

Abstract: *Introduction*: Recent studies on stroke in sub-Saharan Africa have focused on clinical and therapeutic specificities, overlooking their epidemiological aspects. *Objective*: We conducted this study with the aim of updating the epidemiological, clinical, and evolutionary aspects of strokes at the University Teaching Hospital of Kara (Northern Togo). *Patients and Methods*: From July 1st to December 31st, 2022, a prospective study was conducted in the Neurology Department of the University Hospital of Kara (Togo) on patients hospitalized for stroke. *Results*: Stroke accounted for 71.68% of Neurology admissions. Eighty-one patients were included, of which 45 (55.56%) were female. The mean age was 55.04 ± 15.72 years (17-93). Ischemic stroke occurred in 46 patients (56.79%). The main cardiovascular risk factors were personal hypertension (n = 46; 56.79%), familial hypertension (n = 37; 45.68%), dyslipidemia (n = 24; 29.63%), and smoking (n = 18; 22.22%). The main symptoms were motor deficit (n = 55; 67.90%), unusual headaches (n = 28; 34.57%), language disorders (n = 27; 33.33%), and altered consciousness (n = 25; 38.86%). The onset was sudden in 79.01% of cases (n = 64). The mean GCS was 13.74 ± 2.55 in patients with ischemic stroke and 11.00 ± 4.27 in those with hemorrhagic stroke, with p = 0.003. Eight patients (13.11%) had a GCS below 7; and among them, 87.50% (n = 7) had a hemorrhagic stroke (p = 0.008). Motor deficit was observed in 71 out of the 74 evaluated patients (95.95%). Among patients who had a NIHS scale ≥ 15 (n = 43), 51.16% (n = 22) had hemorrhagic stroke, with no significant differences according to the type of stroke (p = 0.124; RR = 1.38; 95% CI: [0.92 - 2.06]). Middle cerebral artery (MCA) was involved in 87.5% of cases of ischemic stroke. Isolated involvement of the infratentorial region was found in 9 patients, of which 6 (66.67%) were hemorrhagic. The mean ICH score of patients with hemorrhagic stroke was 2.06 ± 1.37 ([0 – 5]). The mortality rate was 23.46% (n = 19), with 40.00% in hemorrhagic stroke versus 10.87% in ischemic stroke (p = 0.002; RR = 3.68; 95% CI: [1.46-9.25]). Patients with ischemic stroke had a heavier physical disability at discharge from the hospital. *Conclusion*: The results of this study can serve as a basis to guide public health policies and the management of stroke patients in this region.

Keywords: Stroke, University Teaching Hospital, Kara, Togo, Sub-Saharan Africa

1. Introduction

The 2017 Global Burden of Disease study showed that stroke was the third leading cause of combined death and disability (measured by disability-adjusted life years) and the second leading cause of death worldwide in 2017 [1, 2]. In 2019, the incidence of stroke was 12.2 million and the prevalence was 101 million, with 6.55 million stroke-related

deaths [3]. Forecasts of stroke burden show an increase in both incidence and mortality, highlighting the need for increased surveillance of stroke morbidity and mortality to continuously inform healthcare systems. The advancement of medical technology in developed countries has led to a reversal of stroke complications in these countries compared to developing countries. Overall, Asia, North Africa, and the Middle East were the regions most affected by stroke in 2017, while high-income regions of North America, Australia, Europe, and some parts of South America were the least affected [2].

In sub-Saharan African countries, studies conducted over the past decade have primarily focused on clinical and therapeutic aspects as well as advancements in stroke management [4–10]. However, they have overlooked the true epidemiological aspects of stroke in these countries. Recent studies conducted in Togo have mainly explored survival prognostics and various scores related to stroke [11–14]. Before October 2021, the city of Kara lacked an operational CT scan service, which made it impossible to perform on-site brain scans to confirm a stroke diagnosis. Patients had to either travel to Lomé, the capital, which is located 420 km from Kara, or to Djougou, located 70 km from Kara in Benin, a neighboring country, with the constraints related to customs formalities. This difficulty in accessing CT scans had a negative impact on the rate of cerebral imaging. Since the establishment of a CT scan service in a private clinic in Kara, the performance of brain imaging has become less restrictive. Therefore, a new study is justified after Kumako et al.'s study [12], which dates back five years. The aim of this new study was to determine the epidemiological, clinical, and evolutionary characteristics of stroke in hospitalized patients at the University Teaching Hospital of Kara.

2. Patients and Method

Study Setting

The study was conducted in the Neurology Department of the University Teaching Hospital (UTH) of Kara, which is the third largest university hospital in Togo, after those in the capital, Lomé. The UTH of Kara (UTH-K) is the reference center for the northern part of Togo. The neurology service of UTH-K is not individualized. It is an integral part of the Department of Medicine and Medical Specialties and thus shares the same hospitalization beds with the other services of this department. On average, 343 patients are hospitalized each year for neurological pathologies.

Method

1) Study design and population: This was a prospective, descriptive and analytic study conducted over a six-month period, from July 1 to December 31, 2022. The study included patients who were hospitalized for stroke. The positive diagnosis of stroke was based on clinical features and brain imaging, including cerebral CT scan, which was the only available imaging exam. Clinical features consisted of sudden focal neurological deficit. Once the CT scan was performed, the diagnosis of hemorrhagic stroke was confirmed upon identification of spontaneous intra-parenchymal hyperdensity. The diagnosis of ischemic stroke was established when a vascular topography-based hypodensity was observed on imaging or when the early CT scan (< 24 hours) was normal, but there was a persistent focal neurological deficit clinically. Patients suspected of having a stroke but unable to undergo CT scan were excluded from this study.
2) Data collection: It was done using a questionnaire containing questions grouped into several items (sociodemographic data; mode of onset; personal, familial and lifestyle history; clinical examination; complementary examinations; treatment response and duration of hospitalization, discharge mode).
3) Definitions and scores used: For all patients, the National Institute of Health Stroke (NIHS) scale was used as defined by Brott et al. [15]. Four clinical severity stages were distinguished based on this scale. An NIHS scale between 1 and 4 indicates a minor stroke, a score between 5 and 14 indicates a moderate stroke, a score between 15 and 19 indicates a severe stroke, and a score above 20 indicates a very severe stroke. It was calculated at admission and patient discharge. The modified Rankin Score (mRS) of van Swieten in 1988 [16] was also determined based on the patient's autonomy status before admission and at the time of discharge. When the diagnosis of hemorrhagic stroke was confirmed, the radiologist determined the volume of the hematoma, allowing us to calculate the Intracerebral Hemorrhage (ICH) score based on the scale developed by Hemphill in 2001 in the United States [17].
4) Statistical analysis: It was performed using the Epi Info version 7.2.5 software. Qualitative variables were described in terms of frequencies or proportions. As for quantitative variables, their position and dispersion parameters were described: the mean and standard deviation were used for normal distributions, while the median and interquartile (IQ) range were used for non-normal distributions. Some parameters were dichotomized to facilitate statistical tests. This was the case for the Glasgow Coma Scale (GCS), for which a score below 7 was considered a profound alteration of consciousness. An mRS at discharge below 3 was considered a minor handicap. The statistical tests performed were the Chi-2 test for qualitative variables or the Fisher's exact test when the sample size of a variable was less than 5, and the Student's T-test for quantitative variables. For all tests, probability values (p) less than 0.05 were considered statistically significant.
5) Ethical considerations: Ethics committee approval was obtained before the start of this study. In addition, each participant or their designated representative was assured of anonymity and gave informed consent before information was collected.

3. Results

Epidemiological and Sociodemographic Features

From July 1st to December 31st, 2022, a total of 113 patients were hospitalized in the neurology department, of whom 89 presented with typical stroke symptoms. Among these, 81 met our inclusion criteria, representing 71.68% of neurology hospitalizations. Of the 81 patients, 45 (55.56%) were female, resulting in a male-to-female ratio of 0.8. Ischemic stroke was present in 46 (56.79%) patients. The mean age was 55.04 ± 15.72 years, with a range of 17 to 93 years (IQ: [45 – 65]). The mean age was 57.46 ± 15.53 years for patients with ischemic stroke and 51.86 ± 15.61 years for those with hemorrhagic stroke (p = 0.113). For hemorrhagic stroke, women (n = 24; 53.33%) were more affected than men (n = 11; 30.56%), with p = 0.040 (RR = 1.75, 95% CI [0.99 – 3.07]). The age groups most affected were 35 to 54 years (n = 33; 40.74%) and 55 to 75 years (n = 34; 41.98%), with no significant difference between sexes (54.89 ± 15.93 years for men and 55.16 ± 15.72 years for women, p = 0.298). On average, 13 patients were admitted per month for stroke. The number of patients who were referred was 68 (83.95%). Ambulance transport was used for 10 patients (12.35%). Sociodemographic characteristics are shown in Table 1.

Table 1. *Sociodemographic Characteristics.*

	Strokes (n = 81; 100 %)	**Ischemic strokes (n = 46; 56.79 %)**	**Hemorrhagic strokes (n = 35; 43.21 %)**	**p (Statistic Tests)**
Sex				
Male	36 (44.44)	25 (69.44)	11 (30.56)	p = 0.040 (Chi2)
Female	45 (55.56)	21 (46.67)	24 (53.33)	
Mean age (M ± SD)	55.04 ± 15.72	57.46 ± 15.53	51.86 ± 15.61	p = 0.113 (T-Test)
Age groups (years)				
[15 – 35[	6 (7.41)	3 (50.00)	3 (50.00)	
[35 – 55[	33 (40.74)	15 (45.45)	18 (54.55)	
[55 – 75[	34 (41.98)	22 (64.71)	12 (32.29)	p = 0.298 (Fisher exact)
[75 – 95[	8 (9.88)	6 (75.00)	2 (25.00)	
Admission modes				
Referred	68 (83.95)	39 (57.35))	29 (42.65)	p = 0.82 (Chi2)
Direct	13 (16.05)	7 (53.85)	6 (46.15)	
Transportation modes				
Motorcycle	7 (8.64)	4 (57.14)	3 (42.86)	
NMC	64 (79.01)	38 (59.38)	26 (40.63)	
Ambulance	10 (12.35)	4 (40)	6 (60)	
Frequency of admission per month				
July	18 (22.22)	12 (33.33)	6 (66.67)	
August	11 (13.58)	6 (54.55)	5 (45.45)	
September	11 (13.58)	8 (72.73)	3 (27.27)	p = 0.63 (Fisher exact)
October	13 (16.05)	6 (46.15)	7 (53.85)	
November	12 (14.81)	7 (58.33)	5 (41.67)	
December	16 (19.75)	7 (43.75)	9 (56.25)	
M: Mean	SD: Standard deviation NMC: Non-medicalized car			

Risk factors and Clinical Features

The main cardiovascular risk factors encountered were personal hypertension (n = 46; 56.79%), family history of hypertension (n = 37; 45.68%), dyslipidemia (n = 24; 29.63%), and smoking (n = 18; 22.22%) (see Figure 1). At admission, the mean systolic blood pressure (SBP) was 154.40 ± 35.16 mm Hg (range: [70; 264]) and the mean diastolic blood pressure (DBP) was 97.73 ± 20.84 mm Hg (range: [40; 167]), without significant differences between different classes of SBP (p = 0.358) and DBP (p = 0.103) according to the type of stroke (Table 2). The most commonly reported symptoms by the patients were motor deficit (n = 55; 67.90%), unusual headaches (n = 28; 34.57%), language disorders (n= 27; 33.33%), and consciousness disorders (see Figure 2). In 64 patients (79.01%), symptoms occurred suddenly (Table 2). They occurred during usual activities in 34 patients (41.98%) and at rest in 22 others (27.16%). Before admission, 77 patients (95.06%) had a mRS of 0. Among patients (n = 61) whose language parameter was not disturbed by aphasia, the mean GCS was 13.74 ± 2.55 in patients with ischemic stroke and 11.00 ± 4.27 in those with hemorrhagic stroke, with p = 0.003. Eight patients (13.11%) had a GCS below 7; and among them, 87.50% (n = 7) had a hemorrhagic stroke (p = 0.008). Motor deficit could not be evaluated in 7 patients due to profound impairment of consciousness. Among the 74 patients who could be evaluated for motor deficit, 71 (95.95%) had motor deficit. The mean NIHS scale was 13.86 ± 7.53 (range: [0; 26]). Among patients who had a NIHS scale ≥ 15 (n = 43), 51.16% (n = 22) had hemorrhagic stroke (Table 2), with no significant differences according to the type of stroke (p = 0.124; RR = 1.38; 95% CI: [0.92 - 2.06]).

Table 2. *Clinical characteristics.*

	Global Stroke	IS	HS	p (Statistic Tests)
Onset mode of symptoms				
Sudden	64 (79.01)	38 (59.38)	26 (40.62)	
Gradually	8 (9.88)	4 (50.00)	4 (50.00)	0.643 (Chi2)
Rapidly progressive	9 (11.11)	4 (44.44)	5 (55.56)	
Blood pressure (mm Hg)				
SBP (M ± SD)	154.40 ± 35.16	149.17 ± 36.02	161.26 ± 33.26	0.122 (T-test)
DBP (M ± SD)	93.73 ± 20.84	89.98 ± 20.51	98.66 ± 20.51	0.063 (T-test)
Range of SBP				
< 140	26	18 (69.23)	8 (30.77)	
[140 – 160[	15	9 (60.00)	6 (40.00)	0.358 (Chi2)
[16 – 180[	18	8 (44.44)	10 (55.56)	
≥ 180	22	11 (50.00)	11 (50.00)	
Range of DBP				
< 90	27	18 (66.67)	9 (33.33)	
[90 – 100[	20	14 (70.00)	6 (30.00)	0.103 (Chi2)
[100 – 110[	15	7 (46.67)	8 (53.33)	
≥ 110	19	7 (36.84)	12 (63.16)	
GCS (M ± SD)	12.57 ± 3.63	13.74 ± 2.55	11.00 ± 4.27	0.003 (T-test)
Range of GCS (n = 61)				
[3 – 7[	8	1 (12.50)	7 (87.50)	0.008 (Fisher exact)
[7 – 15]	53	34 (64.15)	19 (35.85)	
Score de NIHS (M ± SD)	13.86 ± 7.53	12.91 ± 6.77	15.11 ± 8.36	0.194 (T-test)
Range of NIHS scale				
< 15	38	25 (65.79)	13 (34.21)	0.124 (Chi-2)
≥ 15	43	21 (48.84)	22 (51.16)	

IS: Ischemic stroke; HS: Hemorrhagic stroke; SBP: Systolic blood pressure; DBP: diastolic blood pressure; M: mean; SD: standard deviation, GCS: Glasgow Coma Scale

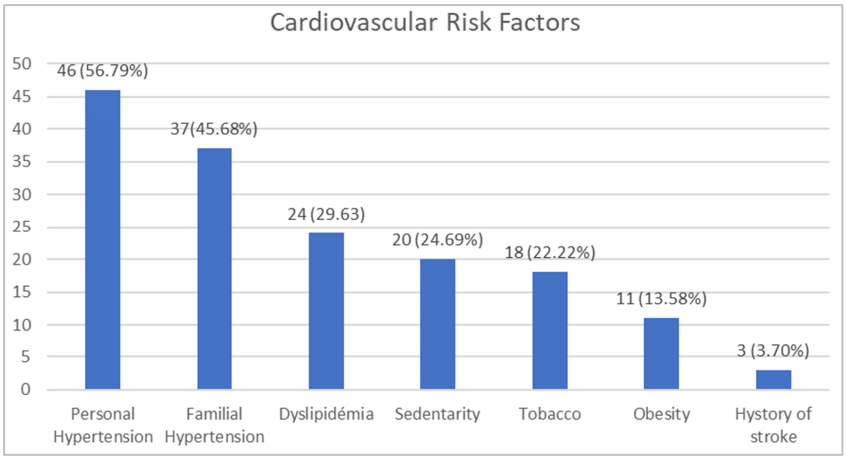

Figure 1. *Main cardiovascular risk factors of strokes.*

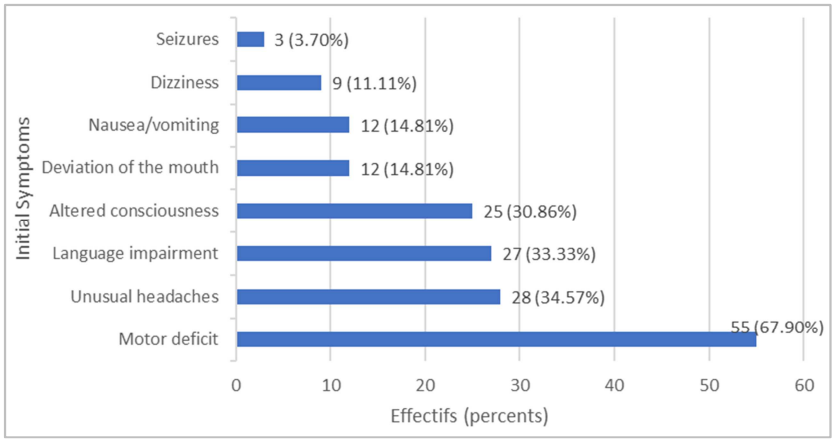

Figure 2. *Main initial symptoms.*

CT scan findings in stroke patients

Hemispheric strokes were the most frequent (n=63; 77.78%). Four patients (4.94%) had strokes affecting both the supra and infratentorial levels. Ischemic strokes confirmed by CT scan (n=40) were mainly located in the middle cerebral artery (MCA) territory, found in 35 patients (87.50%). Malignant MCA syndrome represented 11.43% (n=4) of ischemic strokes in the MCA territory. Isolated infratentorial strokes (n=9) were hemorrhagic in nature in 6 (66.67%) patients. The mean ICH score of patients with hemorrhagic stroke (n=35) was 2.06 ± 1.37 (range: [0; 5]).

Characteristics of paraclinical investigations for etiological research

Cerebral angiography requested for etiological research in hemorrhagic stroke patients could only be performed in 3 patients, allowing for the discovery of cerebral venous thrombosis (CVT) as the cause of hemorrhagic stroke in a 16-year-old patient. Doppler ultrasound of the supra-aortic trunks (SAT) requested for etiological research in 35 patients with ischemic stroke was performed in 5 patients (20.00%). It allowed for the discovery of carotid dissection in 2 patients, who were 37 and 42 years old. Atrial fibrillation (AF) was found in 4 patients, who had all suffered from malignant MCA syndrome.

Outcome and prognosis

Return home was possible for 62 patients (76.54%), including 37 (59.68%) on medical prescription. The average length of hospitalization for survivors was 12.16 ± 7.43 days (range: [1 - 38]). Death occurred in 19 patients (23.46%), on average after 3.32 ± 2.77 days (range: [0 - 10]). Mortality related to hemorrhagic strokes was 40% (14 patients out of 35) compared to 10.87% (5 patients out of 46) for ischemic strokes, with p = 0.002 (RR=3.68; 95% CI: [1.46 – 9.25]). The mRS score was measured at discharge for 57 patients and was between 3 and 5 for 33 (57.89%) of them. Depending on the type of stroke, a lower modified Rankin score was noted between 3 and 5 for patients with hemorrhagic stroke (n=10; 50%) compared to those affected by ischemic stroke (n=23; 62.16%), with a p-value of 0.37 on the Chi-squared test (RR=0.80; 95% CI: [0.49-1.33]).

4. Discussion

We conducted a prospective 6-month study on stroke patients at CHU Kara, aiming to describe the sociodemographic, clinical, and evolutionary characteristics of patients hospitalized for stroke. The small sample size does not allow for generalization of the data to the entire population. However, it does provide results that may lead to a larger-scale study.

Epidemiological and Sociodemographic Features

From an epidemiological standpoint, strokes accounted for 71.68% of hospitalizations in neurology. There was a predominance of females at 55.56% (male-to-female sex ratio of 0.8), with a mean age of 55.04 ± 15.72 years and a range of 17 to 93 years (IQ: [45-65]). Our study's findings are consistent with those of Kumako et al. [12], who reported a predominance of females in a similar study in 2017 at the same department. Although a predominance of males is more commonly reported in most studies [18–20], a systematic review covering 19 countries on 5 continents concluded that females were predominant, with 16,255 cases of stroke in women versus 14,149 cases in men, corresponding to a male-to-female sex ratio of 0.87 [21]. The mean age of our patients was slightly lower than that reported by Kumako et al. (12) in 2017 in Kara (59.66 ± 14.10 years) and by Tchala et al. [22] in 2020 at CHU Sylvanus Olympio in Lomé, where the mean age was 58.5 years. However, our interquartile range overlapped with that of the latter, which was [48-65]. These results indicate that the age range for Togolese stroke victims is between 45 and 65 years old. Ischemic stroke predominated in our population, affecting 46 patients (56.79%), while hemorrhagic stroke represented 43.21%. The previous study conducted by Kumako et al. [12] in the same department reported the same frequencies. These results demonstrate a relative increase in the prevalence of hemorrhagic stroke in poor countries, as reported in some studies. Indeed, in 2020, Saylor et al. [23] reported that the prevalence of hemorrhagic stroke in sub-Saharan Africa represents more than 35% of strokes, compared to a prevalence of 10-20% in developed countries. Specifically in West Africa, the multicenter SIREN study conducted simultaneously in Ghana and Nigeria in 15 medical centers, allowed Sarfo et al. [24] to report a prevalence of 30% (n=854) of hemorrhagic stroke, thus confirming the notion of a higher prevalence of this type of stroke than in developed countries.

Clinical Features

Both personal (56.79%) and family (45.68%) high blood pressure (HBP) were the most common modifiable cardiovascular risk factors (CRFs) found among patients in our study. This finding confirms the preeminent role of HBP among the CRFs for stroke, as reported by numerous previous studies [12, 19, 20, 22, 25]. In fact, the INTERSTROKE study [26], which included 32 countries in Asia, the Americas, Europe, the Middle East, and Africa, identified HBP as the leading modifiable CRF for stroke with an odds' ratio of 4.01 (95% CI: 2.59-6.21). Furthermore, the previous works of Walker et al. in 1994 [27] and Sacco et al in 1955 [28] showed a strong correlation of this risk both with elevated SBP and DBP. According to these two authors, a 10 mm Hg increase in mean arterial pressure increases the risk of stroke by 20-30% [27, 28]. In summary, HBP is a crucial modifiable cardiovascular risk factor that should be taken into account for stroke prevention. Hypertension is considered an epidemic in sub-Saharan Africa, especially since a recent meta-analysis in this region showed that it is present in 30% of subjects over 30 years of age. Among these, only 27% are aware of their condition, and only 18% are receiving treatment, while 7% are monitoring their blood pressure [29]. The most commonly reported symptoms by patients and their families were motor deficit (n = 55;

67.90%), unusual headaches (n = 28; 34.57%), language disorders (n= 27; 33.33%), and consciousness disorders (n = 25; 38.86%). These symptoms occurred suddenly in 64 patients (79.01%). Motor deficit is by far the most indicative symptom of stroke, especially due to its sudden onset. Lawrence et al. in 2001 [30] reported in "*The Stroke*" that motor deficits affected the upper and lower limbs in 77.4% and 72.4% of cases, respectively. As early as 1987, Wade et al. [31] reported this high frequency of motor deficits in stroke patients. Motor deficits, along with language disorders, should prompt patients to seek medical attention immediately. This is the goal of the strategy implemented by developed countries through the Cincinnati Prehospital Stroke Scale (CPSS) [32]. The CPSS involves three parameters: Face (F), Arm (A), and Speech (S). It is a simplified form of the NIHS scale that is easy to explain to the population and teach during awareness campaigns. The CPSS gave rise to the concept of "FAST," the effectiveness of which in reducing the time to consultation was demonstrated in Berglund's study in 2014 [33]. FAST is an acronym that uses the letters of the CPSS, with the addition of T (Time) to emphasize the importance of seeking medical attention quickly. Patients with an NIHS score ≥ 15 were considered to have a clinically severe condition. Their proportion was 51.16% (n = 43) in hemorrhagic stroke patients and 48.84% (n = 21) in ischemic stroke patients, with a p-value of 0.124. Similar to blood pressure, clinical severity based on the NIHS score does not predict the type of stroke.

CT scan findings in stroke patients

In terms of CT scans, ischemic stroke with a rate of 56.79% (n=46) was more common than hemorrhagic stroke. This proportion of ischemic stroke is consistent with that reported by Kumako et al. [12], who reported 56.7% of ischemic strokes in 2017. Similar results were reported by Tchala et al. [22] in Lomé (Togo) in 2020, with a rate of 55.28% for ischemic strokes. The predominance of ischemic stroke is confirmed by studies both in sub-Saharan Africa [5, 19, 34], where the rate of ischemic stroke is generally between 50 and 60%, and in developed countries where the predominance of ischemic stroke is much higher with a rate approaching or exceeding 80% [35–38]. The middle cerebral artery (MCA) is the most affected territory during ischemic stroke and accounts for 87.50% of ischemic strokes in the supratentorial level in our study. The MCA was also the most affected in the study by Evelyne et al. [19]. The relatively large width of this artery explains the ease with which thrombotic or embolic material can migrate and follow its path. If ischemic strokes have a low prevalence in the sub-Saharan regions, the rate of hemorrhagic strokes is therefore higher in these countries. The strong correlation between hypertension and intracerebral hematomas, especially the deepest ones, suggests that poor hypertension control in low-income countries where health insurance coverage is insufficient could explain the high prevalence of hemorrhagic strokes in these countries [38]. However, other studies have shown that even living in the same conditions and in the same geographic era, the prevalence of hypertension is higher in the Black race, predisposing them to deep intracerebral hematomas [39]. Outcome and prognosis.

In this study, death occurred in 19 patients (23.46%), on average after 3.32 ± 2.77 days (range: [0; 10]). The mortality rate for hemorrhagic strokes was 40% (14 patients out of 35), compared to 10.87% (5 patients out of 46) for ischemic strokes with p=0.002 (RR=3.68; 95% CI: [1.46-9.25]). Desalu in Nigeria [25] reported a mortality rate of 26.7% for strokes, while Basse et al. in Senegal in 2017 [20] reported a relatively low mortality rate of 12%. As in our study, Basse [20] reported that the mortality rate due to hemorrhagic strokes (15.6%) was also higher than that associated with ischemic strokes (6.99%). In northern countries, the mortality rate for strokes is very low due to their advances in the management of this condition. Indeed, according to the Rochester Epidemiologic Project, the risk of death after a first ischemic stroke was 7% at 7 days and 14% at 30 days [40]. Predictive factors for hemorrhagic stroke mortality have already been proven by other studies conducted in Togo, both monocentric and multicentric [13, 14]. These studies reveal that the ICH score is the main element strongly correlated with death. This score takes into account other parameters, including age, consciousness level evaluated with the GCS, hematoma volume, the presence of blood in the ventricles or in the sub-tentorial level. The ICH score is thus a concentrate of other parameters for evaluating the survival of a patient suffering from a hemorrhagic stroke. Upon discharge from the hospital, patients who suffered from ischemic stroke had a greater disability rate (62.16%) compared to those who had a hemorrhagic stroke (50.00%), but the difference was not statistically significant (p=0.37).

5. Conclusion

The present study confirms that strokes remain a major public health concern, although the study period is short and the sample size is relatively small. It should be noted that strokes in our country affect young adults who are still active, and approximately one out of four patients die. Hypertension remains the greatest risk factor for strokes and, at the same time, the major cause of deep hematomas, which have a 40% lethality rate. The fight should be intensified on primary prevention through adequate management of this scourge or through large-scale awareness campaigns about this silent killer.

Conflict of Interest

The authors declare no conflict of interest related to this study.

Acknowledgements

We warmly thank the medical team of the Neurology Department at UTH Kara for their collaboration and support throughout this study, as well as all the patients and their families who agreed to participate in this research and share

their experiences with us. We also extend our gratitude to the members of the review committee for their valuable feedback and suggestions.

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