Scientific Research Publishing

Neuroscience and Medicine, 2025, 16(2), 91-101
https://www.scirp.org/journal/nm
ISSN Online: 2158-2947
ISSN Print: 2158-2912

Epidemiological, Clinical and Therapeutic Aspects of Cerebrovascular Accidents at the N'Djamena National Referral Hospital in Chad

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How to cite this paper: Zenal Abidine, A.H., Soumaila, B., Guelngar, C.O., Milman, K.J., Gueralbaye, N.D. and Toure, K. (2025) Epidemiological, Clinical and Therapeutic Aspects of Cerebrovascular Accidents at the N'Djamena National Referral Hospital in Chad. *Neuroscience and Medicine*, **16**, 91-101.
https://doi.org/10.4236/nm.2025.162010

Received: April 16, 2025
Accepted: June 15, 2025
Published: June 18, 2025

Abstract

Introduction: Stroke is a heterogeneous group of acute neurological pathologies linked to the dysfunction, occlusion or rupture of an intracranial vascular structure. The aim of our study was to describe the epidemiological, clinical and therapeutic aspects of stroke in our context. **Patients and Methods:** This is a descriptive and prospective study covering a 15-month period from July 2022 to October 2023. Our study included all patients aged at least 15 years or older, admitted to the cardiology and neurology departments, with a clinical and/or CT diagnosis of stroke. This is an exhaustive sampling. **Results:** Out of 1173 patients admitted to the cardiology and neurology department, 203 had suffered a stroke, representing a frequency of 17.3%. The average age of patients was 59.5 years, with extremes of 15 and 85 years. The most common age group was 60 - 64, with 16.8% (n = 23) of men and 13.6% (n = 9) of women, followed by 70 - 74, with 12.4% (n = 17) of men and 19.7% of women. By sex, the age group most represented among men was 60 - 64 (16.8%) and among women 70 - 74 (19.7%). In 72.9% (n = 148) of cases, the onset of the disease was abrupt, compared with 27.1% (n = 66) with a gradual onset. **Conclusion:** At the end of this study carried out in N'Djamena, we can conclude that strokes are frequent and serious neurological disorders in our country. They constitute a therapeutic emergency. Treatment is marred by shortcomings due to a lack of qualified human resources. We recommend that patients avoid turning to traditional practitioners and marabouts when faced with hemiplegia, in order to better respect the 4 h 30 min treatment timeframe and improve stroke care in Chad. A subsequent study will provide a better understanding of stroke mortality in Chad, providing a window of opportunity for new therapeutic

interventions.

Keywords

Stroke, Epidemiology, Treatment, N'Djamena, Reference Hospital, Chad

1. Introduction

Stroke is a heterogeneous group of acute neurological conditions associated with dysfunction, occlusion or rupture of an intracranial vascular structure [1]. There are two main groups of stroke [1]: cerebral ischaemic stroke (transient ischaemic attacks, full-blown ischaemic attacks and cerebral venous thrombosis) and cerebral haemorrhagic stroke (intra-parenchymal haemorrhage and meningeal haemorrhage). They often result in the sudden onset of a focal neurological deficit [2]. They are clearly a major public health problem because of their high frequency. Every year, around 15 million people worldwide suffer a stroke [3]. In developed countries, stroke is the leading cause of acquired disability in adults, the second leading cause of vascular dementia after Alzheimer's disease, the third leading cause of death, and a major cause of depression for patients and their families [4] [5]. The cost of treating stroke is estimated at 2.4% of total healthcare expenditure worldwide [4]-[6]. Stroke has a damaging impact on health, with vital and functional prognosis often at risk. Stroke management is difficult [7]. They represent an absolute therapeutic emergency, as even a one-minute delay has a negative impact on prognosis [7]-[9]. However, major progress has been made in recent years in the management (diagnosis and treatment in the acute phase within 4 hours and 30 minutes of the onset of the first symptoms) and prevention of these diseases [9].

In Africa, studies have shown that stroke is a major cause of hospitalisation and a frequent cause of death [10].

In Senegal and Nigeria, stroke is the leading cause of hospitalisation in specialised departments [10] [11].

In Mauritania, stroke accounts for 35% of hospital admissions in Nouakchott, with a mortality rate of 20.3% [12].

In Mali, the in-hospital incidence of stroke is 13.5%, with a mortality rate of 22.5% [13].

In Chad, stroke is the leading cause of hospitalisation in the neurology department, with a mortality rate of 34% [14]. A 2010 study of 208 patients at the N'Djamena National General Reference Hospital (HGRN) found a prevalence of 45.2% [14]. However, there are currently no studies on stroke management in Chad.

This study analysed the different forms of stroke encountered in the emergency, cardiology and neurology departments of the CHURN in N'Djamena with a view to improving patient care. The aim was to identify gaps in the knowledge addressed by the study, such as the prevalence of vascular accidents and the effectiveness of

treatment in our department.

2. Patients and Methods

2.1. Exhaustive Sampling

Our study was carried out in the cardiology and neurology department of the Reference Nationale University Hospital, which is the main health facility in Chad. It was a descriptive and prospective study over a 15-month period from July 2022 to October 2023.

2.2. Selection Criteria

- **Inclusion criteria**

All stroke patients seen in consultation who had undergone a major brain scan were included in the study.

- **Exclusion criteria**

This study did not include patients who had been treated for confusional syndrome, epileptic seizures, dementia, severe depression or who did not agree to take part in our survey.

2.3. Data Collection

We selected a sample of 203 cases after applying the selection criteria.

This is an exhaustive sampling.

2.4. Variables studied

- **Socio-demographic variables**
  - Frequency;
  - Age and gender;
  - The profession;
  - Admission procedure;
  - The means of transport used.
- **Clinical variables**
  - Reason for hospitalisation;
  - Installation method;
  - Time to hospital admission;
  - The presence of risk factors;
  - Input parameters (consciousness, blood pressure, results of cardiovascular and neurological examinations).
- **Paraclinical variables**
  - The scanner and its results;
  - ECG results;
  - Cardiac ultrasound results;
  - Blood sugar levels.
- **Therapeutic variables**
  - First recourse;

- The treatment regimen instituted;
- Length of hospital stay.

2.5. Data Collection

Our data was collected on an individual form drawn up for this purpose, and the data was processed manually.

2.5.1. Analysis and Presentation of Data

The data were entered and processed using software (Word Excel and PowerPoint from the 2013 office pack; Epi-Info V.7.4.0). We presented our results in the form of Figure 1, Figure 2 and Tables 1-5. They were discussed, commented on and compared with the literature data available to us.

2.5.2. Ethical Considerations

All the information obtained is used for purely scientific purposes, and confidentiality was maintained throughout the study period.

3. Results

3.1. Frequency

Out of 1173 patients admitted to the cardiology and neurology department, 203 had suffered a stroke, representing a frequency of 17.3%.

3.2. Socio-Demographic Characteristics

Age and Gender

The average age of patients was 59.5 years, with extremes of 15 and 85 years. The most common age group was 60 - 64, with 16.8% (n = 23) of men and 13.6% (n = 9) of women, followed by 70 - 74, with 12.4% (n = 17) of men and 19.7% of women. The 2nd age group represented was 50 - 54, with 13.9% (n = 19) of men and 1.5% (n = 1) of women. A statistically significant difference was found with (p = 0.005).

Overall, the age group with the most cases was 45 - 74 years, and there was a predominance of males with a ratio of 2, *i.e.*, 67.5% (n = 137) compared with 32.5% (n = 66) for females.

By sex, the age group most represented among men was 60 - 64 (16.8%) and among women 70 - 74 (19.7%). (See Table 1)

3.3. Profession

Most of the patients (36.4%) were civil servants. (See Figure 1)

Others are made up of marabouts, retired people and people without a profession.

3.4. Clinical Data

3.4.1. Stroke Installation Method

In 72.9% (n = 148) of cases, the onset of the disease was abrupt, compared with 27.1% (n = 66) with a gradual onset.

Table 1. Breakdown of patients by age and sex.

Age range	Gender				Chi²	P
	Male		Female			
	N	%	N	%		
15 - 19 years	1	0.7	2	3.0	1.62	0.203
20 - 24 years old	1	0.7	2	3.0	1.62	0.203
25 - 29 years old	1	0.7	2	3.0	1.62	0.203
30 - 34 years old	1	0.7	1	1.5	0.28	0.595
35 - 39 years old	2	1.5	2	3.0	0.57	0.450
40 - 44 years old	7	5.1	1	1.5	1.52	0.217
45 - 49 years old	**17**	**12.4**	**10**	**15.2**	0.29	0.589
50 - 54 years old	19	13.9	1	1.5	7.65	**0.005**
Age 55 - 59	17	12.4	10	15.2	0.29	0.589
60 - 64 years old	**23**	**16.8**	**9**	**13.6**	0.20	0.653
65 - 69 years	18	13.1	7	10.6	0.26	0.606
70 - 74 years	**17**	**12.4**	**13**	**19.7**	1.88	0.170
75 - 79 years	4	2.9	3	4.5	0.35	0.552
80 and over	9	6.6	3	4.5	0.33	0.566
Total	**137**	**100**	**66**	**100**		

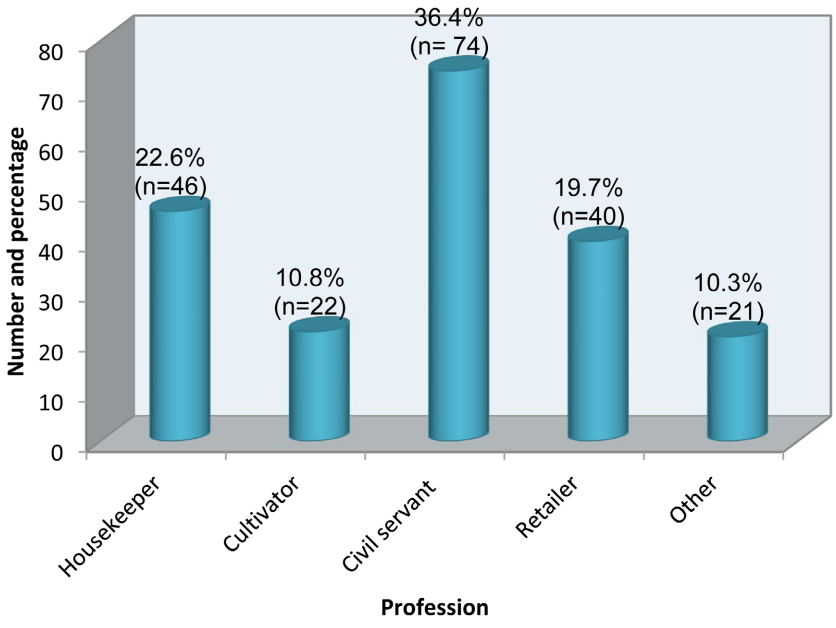

Figure 1. Distribution of patients by profession.

3.4.2. Admission Procedure

The majority of patients, 71.4% (n = 145), were not referred. (See **Figure 2**)

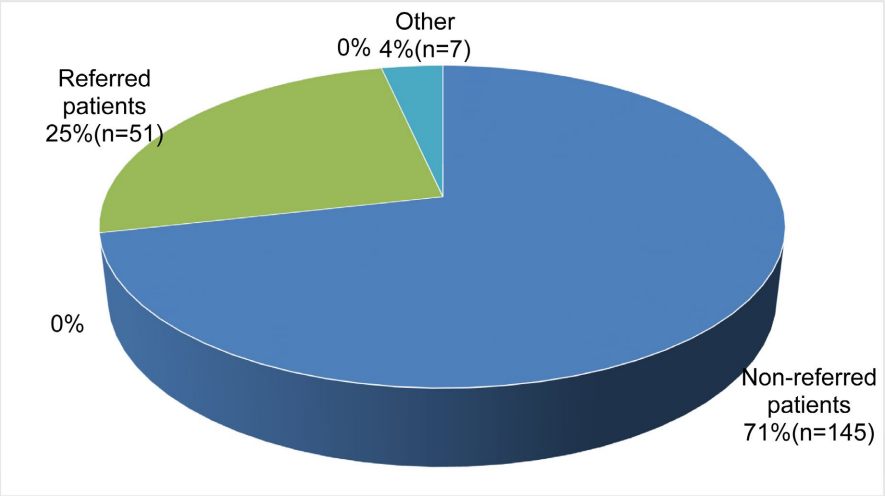

Figure 2. Distribution of patients by mode of admission.

Table 2. Breakdown of patients by time to hospital admission.

Time taken	Workforce	%
<6 h	01	0.5
7 a.m. to midnight	20	9.8
From 24 hours to 5 days	50	24.6
From 6 to 10 days	**70**	**34.5**
>10 days	62	30.5
Total	**203**	**100**

Table 3. Breakdown of patients by reason for hospitalization.

Designs	Workforce	%
Hemiplegia	**141**	**69.5**
Headaches	20	9.8
Fall from height with loss of consciousness	11	5.4
Consciousness disorders	10	4.9
Speech impairment	9	4.4
Facial paralysis	4	1.9
Jet vomiting	4	1.9
Single paresis	3	1.5
Diplopia	1	0.5
Total	**203**	**100**

3.5. Paraclinical Data

3.5.1. Computed Tomography (CT) and Different Types of Stroke

Cerebral CT scans were performed in only 132 patients. Ischaemic stroke was the most common type of stroke, accounting for 39.4% of cases. (See **Table 4**)

Table 4. Distribution of patients who underwent CT scans and the different types of stroke.

CT scan results	Workforce	%
Ischemia	**80**	**39.4**
Haemorrhage	38	18.7
Normal	05	02.5
Other	09	04.4
CT scan not performed	71	35
Total	**203**	**100**

3.5.2. Therapeutic Data

First steps taken upon admission.

The procedures applied to our patients were bronchial aspiration, nasogastric catheterization, urinary catheterization and oxygen therapy, depending on the indications. Thus:

- Bronchial aspiration in 19.7% of cases (n = 40);
- Nasogastric tubes were indicated in 49.2% of cases (n = 100);
- Urinary catheterisation in 48.7% of cases (n = 99);
- Oxygen therapy in 34.4% of cases (n = 70).

Non-specific drug treatment.

The non-specific drug treatment given to our patients was neuroprotective agents, complex B vitamins, physiotherapy, paracetamol and diazepam as indicated.

- Neuroprotective agents (Nootropyl*, Tanakan*): more than half of our patients (83.2%) had received neuroprotective agents.
- Complex B vitamins were indicated in 40.8% (n = 83).
- Paracetamol was prescribed in 73.8% of cases (n = 150).
- Diazepam was used in 35.9% (n = 73) of cases.
- Nursing was applied in the majority of our patients.

Treatment of arterial hypertension.

In this series of studies, 29% (n = 58) had a PAS > 220 mmHg.

(Loxen); 16% (n = 37) of patients with a DBP >120 mmHg also received nicardipine.

Treatment regimens are instituted depending on the type of stroke. (See Table 5)

Table 5. Treatment regimens instituted.

Type of stroke	Treatment regimens
AIT	Anti-vitamin K (Sintrom*) 2 - 6 months Aspegic* relay 100 mg/d
AVCI constituted	Anticoagulant (LMWH): Lovenox* 0.5 - 1 g/kg/dr subcutaneous over 6 - 7 days Aspegic 100 mg/d
AVCH	Osmotherapy: Mannitol 1 fl of 10 ml × 3/d in 20 mn 3 - 6 days

Anti-vitamin K (Sintrom*) was used in 2.5% of cases.

Antiplatelet agent (Aspegic*) in 72.2%.

Anticoagulants (Lovenox*) in 12.8% of cases.

Mannitol was used in 16.2% of cases.

4. Discussion

The study lasted 15 months; 1173 patients were admitted to the cardiology and neurology department, and 203 had a stroke, representing a frequency of 17.3%.

In this series of studies, the mode of onset was mentioned in 148 patients, *i.e.*, 72.9%. Our results are close to those of [14], which reported 80%. These results are in line with the data in the literature, which confirm the sudden onset nature of strokes.

According to this series of studies, 34.5% of our patients were admitted to hospital between the sixth and tenth day after the onset of the first stroke symptom. Only 0.5% of patients were admitted within the first few hours. This long delay could be explained by the fact that the general public is unaware of the urgency and seriousness of the disease. It also makes it impossible to treat DVA specifically with thrombolysis, which is only indicated if the patient is admitted within 4 hours 30 minutes and no later than 6 hours after the onset of the first symptoms. The indication also depends on the rapid performance of MRI within this timeframe and in the absence of other contraindications.

According to our study, out of 203 patients, 141 (69.5%) were admitted to the department for hemiplegia and headaches (9.8%). These results are close to those of the authors [14], who found 54.4% (n = 81) for hemiplegia. On the other hand, [14] found 97.2% (n = 70) of patients admitted with altered consciousness. Our results confirm the presence of focal neurological deficits, especially hemiplegia, which is the main cause of stroke.

In this study, 65% of our patients had a CT scan during their hospitalisation. Our results are close to those obtained by [14], who found 62.6%. On the other hand, [15] reported higher results than our study, *i.e.*, 77% of patients who received a CT scan. This difference between our study and that of [15] could be explained by the unavailability of the radiology technicians and the repetitive breakdowns of the machine, and/or the low socio-economic level of our patients, which did not allow them to pay for the necessary means for carrying out the examinations.

In this series, out of 65% of our patients who underwent CT scanning, 62.5% were pathological compared with 2.5% who were normal. These results are close to those of [14], who found 91% pathological compared with 8.9% normal. On the other hand, Ahmad and Guillon reported 32% and 50% pathological results, respectively, lower than those in our study. This difference could be explained by the existence of transient ischaemic attacks, which are rapidly regressive and do not leave any lesions on the CT scan, and/or the time between the appearance of the first symptoms and the performance of the CT scan is short and does not allow the CT scan to visualise the cerebral lesions.

In our series, 39.4% of strokes are ischemic (AVCI) and 18.7% strokes are hemorrhagic (AVCH). Our results are close to those of the authors: [15] 46.2% AVCI versus 42.3% AVCH; [15] 52% AVCI versus 48% AVCH. Indeed, these results confirm the real predominance of AVCI in the literature.

In this study, 12.8% (n = 26) received anticoagulant treatment with low molecular weight heparin (LMWH). This therapy was instituted after a CT scan had revealed the ischaemic nature of the stroke. It was followed by Sintrom (acenocoumarol). Twenty-six percent (26%) of our Patients with DALY did not benefit from treatment because they were not admitted to the department because of the delay in admission in relation to the date of onset of the disease.

Antiplatelet agent: acetylsalicylic acid (Aspegic).

In our series of studies, 71.2% benefited from anti-platelet aggregation therapy. Our results are similar to those of Guillon *et al.* in 2001 in France [14], who reported 74% and 80.8% respectively. This practice is in line with the literature, which authorises their prescription to prevent recurrences and improve mortality, especially in patients with heart disease.

Lethality varies according to the studies and the methods used. In our series of studies, 34% of our patients died. Our results are close to those reported by authors 35.6%, [14] 37.1%. However, Keita *et al.* in Bamako in 2005 [12] reported a relatively low case fatality rate of 22.5%, 20.3%, 20.5% and 8.5% respectively. The high case-fatality rate observed in our series can be explained by the fact that patients arrived at an advanced stage of the disease. There is a delay in carrying out the CT scan despite the fact that the CT scan is the examination that guides the choice of specific treatment. This delay can be explained either by the unavailability of radiologists, or by repeated machine breakdowns. During their stay in hospital, some patients do not have the financial means to undergo the scan, which is expensive in relation to the standard of living of Chadians (50,000FCFA = $89.75 at HGRN, 70,000FCFA = 125.65) at the Hôpital de la Mère et de l'Enfant and more expensive in private health facilities. These non-beneficiary patients end their hospital stay without receiving the ideal treatment. This high mortality rate could also be explained by the inability of staff to make a rapid clinical diagnosis. Trial and error in making a clinical diagnosis prolongs the decision-making process for the treatment of choice.

Furthermore, in our series, 15.2% of patients presented complications (bedsores, malnutrition, pneumopathy, thrombophlebitis, epileptic seizures), results similar to those of the authors [15] who reported the same complications.

Similarly, in this series of studies, 31% of our patients had a favourable outcome with sequelae compared with 16.6% and 27% respectively found by authors [14] and Coulibaly in 2001 in Bamako. The delay in the admission of patients to the department, therefore, delays the early initiation of physiotherapy, which could explain this high difference in deficit in our patients with deficits.

The favourable outcome without sequelae in our series was 14.8%. These results are similar to those of [15], which reported 16.2% compared with 8.33% reported

by [14]. This difference could be explained by the early start of physiotherapy and regular follow-up.

5. Conclusions

At the end of this study carried out in N'Djamena, we can conclude that strokes are frequent and serious neurological disorders in our country. They constitute a public health problem with an estimated frequency of 17.3% [13], affecting all strata of society with an average age of 59.5 years. They are favoured by risk factors, the main ones being high blood pressure, diabetes and alcoholism, which are unfortunately poorly diagnosed and poorly monitored. Stroke is a therapeutic emergency. Clinical diagnosis of stroke is straightforward and involves the sudden appearance of a neurological deficit. A CT scan is the radiological examination used to confirm the diagnosis and distinguish between ischaemic and haemorrhagic stroke. Management is marred by shortcomings due to a lack of qualified human resources and poor technical facilities. The majority of cases had an unfavourable outcome, with 34% resulting in death [14].

We recommend that patients avoid going to traditional healers and marabouts in the event of haemiplegia, in order to improve stroke care in Chad and ensure that treatment takes place within 4 hours and 30 minutes.

A subsequent study will provide a better understanding of stroke mortality in Chad, providing a window of opportunity for new therapeutic interventions.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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