



Epidemiological, Clinical, Etiological and Therapeutic Aspects of Strokes in Subjects under the Age of 50 at the National Hospital of Niamey (NHL) and the National Centre for Drépanocytaire Reference (CNRD): 119 cases

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Abstract

Introduction: Cerebrovascular accidents (CVAs) are a real public health problem throughout the world. They are the most common neurological condition in industrialized countries where they represent: the first cause of acquired disability in adults; the second cause of vascular dementia; the third cause of death, i.e. 9% of deaths. Strokes are more and more frequent in young people with various etiologies.

Objective: To determine the clinical etiological and therapeutic aspects of stroke in Young people.

Results: This is a prospective descriptive study on 119 cases at the NHN and the CNRD during the period from 06 June 2018 to 01 October 2019, i.e. a period of 17 months.

A predominance of women is 51.2%. Average age: 30.59 years \pm 16.45. The patients had consulted a general practitioner before admission, i.e. 64.7%. The largest number of patients was hypertensive, 49.6%. 35.3% of patients had 2 risk factors (migraine and sedentary lifestyle). There is a predominance of left hemiplegia, 20.2%. The majority of patients (58.8%) received less than 24 hours of admission. The majority of patients had a Glasgow score between 11 and 15 (66.4%). We found a rate of anemia and hyperleukocytosis of 3.4% each and 1.7% of polycythemia. Most of the strokes were of sickle cell origin or 26%. The most common abnormality on CT scan was hypodensity with 51.3% of cases. The Sylvian territory was the most affected with 45.4%. 53.8% of patients had taken antihypertensive drugs, 41.2% had taken platelet aggregation inhibitors, 99.2% had received physiotherapy and 7.6% had received anti-edematous therapy. The average length of hospital stay was 7-14 days or 50.4%. The majority of patients had an NIHSS score between 5-15 or 83.2%.

Conclusion: The stroke does not spare the young subject, long considered a disease of the third age. The strokes of the young subject are different from those of the elderly by their multiple etiologies, hence the relentless search for the etiology.

Keywords: Aspects; Clinical; Stroke; Therapeutic; Niamey; Niger

Introduction

Stroke is a real public health problem around the world. They are the most common neurological condition in industrialized countries where they represent: the first (1st) cause of acquired disability in adults; the second (2nd) cause of vascular dementia; the third (3rd) cause of mortality, i.e. 9% of deaths; a major cause of depression in patients and their families; an estimated cost of care at 2.4% of the total cost of health expenditure worldwide [1,2]. According to the WHO, the annual number of strokes worldwide will increase from 16 million in 2005 to 23 million by 2030 and the annual global number of stroke deaths estimated at 5.7 million in 2005 will reach 7.8 million in 2030 [6,7]. In 2005, the number of stroke survivors worldwide was 62 million, and this figure will rise to 77 million in 20 years [8,9]. In developed countries, the incidence of stroke is estimated to be between 420 and 650 per 100,000 person-years [11-13]. In France, every year 120,000 people suffer a stroke, 30,000 of whom will die in the days or months that follow, 60,000 will remain with a disability of varying severity and 30,000 will recover without sequelae. Among the survivors, 50% will have depression within a year, 25% will be demented within 5 years and only 40% of the working population will return to work [3,4]. In the United States, the incidence of stroke has stabilized at around 0.5 to 1 per 1,000 inhabitants [5].

In Japan, this incidence was 3 per 1,000 partly due to environmental, dietary and smoking habits [5]. In Africa, strokes accounted for 30-37% of neurology hospitalizations and were responsible for one-third of deaths [10]. In Senegal and Nigeria, strokes are the leading cause of hospitalization in specialized services [10,15-18].

In Mauritania, strokes accounted for 35% of hospitalizations in the neurology department of Nouakchott [19].

Overall mortality, including cerebral infarction (CI) and intracerebral hemorrhage (IBH), was 20.3% in Mauritania, 44.6% in Ethiopia [10,19,20], 50.6% in Nigeria and 51.1% in Gambia [10,20,21]. In the series with CT scans, mortality from cerebral infarcts was 35.2% in Mali to 38% in Senegal and those from ICH ranged from 51.1% to 56% in the same countries [10,22-20]. In Mali, the hospital frequency of stroke was 13.5% with a mortality rate of 22.5% [21]. In Niger, several studies have been carried out

on strokes but none has focused on young people under 50 years of age. This motivated the choice of our study entitled Epidemiological Aspects, Clinical, Etiological and Therapeutic Aspects of Stroke in Subjects Under 50 Years of Age at HNN and CNRD. Youth is an age group, it includes the non-adult population between 15 and 24 years of age [22]. However, there are several definitions of the young subject.

Methodology

Study framework

Our study took place in the Cardiology and Neurology Department of the National Hospital of Niamey (HNN) and the National Sickle Cell Reference Center.

Materials and Methods

- **Inclusion Criteria:** Patients diagnosed with a stroke clinically and confirmed by a brain scan whose age is less than 50 years.
- **Non-inclusion criteria:** All patients diagnosed with stroke clinically and confirmed by CT scan with an age greater than 50 years.

All patients diagnosed with stroke clinically and confirmed by a CT scan for which their files were not complete.

Materials

We consulted: consultation registers and summoned patients; patients hospitalized in the cardiology and neurology departments, and the sickle cell center; We submitted the questionnaire to the companions of patients who had aphasia or were in a comatose state.

Study method

Our method consisted of three (3) phases:

- **First phase:** The design and preparation phase of the survey sheet. This phase took place at the same time as the application for research authorization to the Faculty of Health Sciences (FSS) of Abdou Moumouni University (UAM) as well as to the administration of the HNN.
- **Second phase:** It aims to find all patients who meet the inclusion criteria. The collection forms were filled in using the information provided in the consultation registers, the patients hospitalized in the various departments concerned (questionnaire completed by a documentary analysis) and we will see them again at the return visit.

- **Third phase:** The data entry and analysis phase; the data was entered on the software Word, Excel (2013) and analyzed by the software, SPSS in its version 20 plus.

Parameters studied: Socio-demographic characteristics (identity, age, sex, profession, marital status, origin, ethnicity).

Family and personal medical history (history of hypertension; concept of stroke in the family), surgical, gynaecological-obstetric (history of taking estrogen-progestogen).

Installation mode

Clinical data (type and nature of deficit)

Paraclinical data (brain scan, MRI, Supraoptic Trunk Doppler ultrasound (EDTSA), cardiac ultrasound, supra-aortic trunk CT angiography, MRI angiography, cerebral arteriography, ECG holter; cardiology consultation with pacemaker questioning).

Treatments undertaken.

Difficulties encountered

The lack or insufficient financial means of patients and their parents to carry out examinations in order to have an etiology.

Delay in admitting patients to a specialized center.

The limitations

The limitations of our study were: the absence of paraclinical examinations such as transthoracic ultrasound (ETT) and transesophageal cardiac ultrasound (TEE) in our country; the lack of financial means to carry out certain examinations.

Ethics and deontology

The confidentiality and anonymity of our patients have been respected.

Results

- During our 17-month study (June 2018 to October 2019), we collected a total of 5424 consultations, including 119 cases of stroke in young subjects, i.e. a frequency of 2.2%.
- The neurology department was the most affected by strokes in young subjects with 69.7%. The majority of patients were female, 51.3%.

- Patients aged 41 to 49 were the most represented with 38.7%.
- Average age: 30.59 years \pm 16.45. Extremes: 2 years old and 49 years old.
- The mean age for DALYs is 29.13 years \pm 16,810 Extremes: 2 and 49 years
- The average age for AVCH is 37.30 years \pm 14,474 Extremes: 4 years and 49 years. Most of the patients aged 41 to 49 years were male with 27 cases.
- The statistical test was not significant between sex and age: $\text{Chi}^2=3.788$ $\text{ddl}=4$ $P=0.435$. The largest number of patients were housewives with 28.1%. The majority of patients came from the urban community of Niamey, i.e. 60.5%. January 2019 was the most affected month, at 9.2%.
- The majority of patients were of Zarma-Sonrai ethnicity, i.e. 52.1%.
- DALYs were the diagnosis made in the majority of patients with 75.6%.

The largest number of patients had 2 risk factors (migraine and sedentary lifestyle) with 35.3%, followed by hypertension. The latter was more common in patients with VHA. Tobacco, obesity, physical inactivity and migraine were more common in patients with DALYs. The time to admission was less than 24 hours in the majority of patients, i.e. 58.8%. Average admission time: 32.4 hours. Extremes: 1 hour and 24 days.

Headaches associated with vertigo were the most common functional signs observed in our patients, 28.6%. Patients admitted for left hemiplegia were the most represented with 20.2%. The majority of patients had a Glasgow score between 11 and 15, or 66.4%. The most common abnormality on CT was hypodensity with 51.3% of cases. The Sylvian territory was the most affected with 45.4%.

Atherosclerotic plaque was found in 8.4% of patients. Most strokes were of sickle cell origin, i.e. 26%. It appears from this table that 53.8% of patients had taken antihypertensives, 41.2% had taken antiplatelet agents and anticoagulants, of which 20% and 21.2% respectively, 99.2% had benefited from physiotherapy and 7.6% had received antioedematous treatment. The mean length of hospital stay was 11.29 days in the majority of patients, i.e. 50.4%.

Average length of stay for DALYs is 10.57 days \pm 6.054 extremes: 2 days and 30 days. Average length of stay for AVCH is 12.04 days \pm 5.927 extremes: 4 days and 25 days. Most of the patients were discharged with left hemiplegia, i.e. 26%. The majority of patients had an NIHSS score between 5-15 or 83.2%. We deplore 9 cases of death, i.e. 7.6%. The male sex evolves the most favourably with 55 cases.

The statistical test is significant between evolution and sex: Chi2=135,710 ddl=22 P=0,000.

Discussion

The overall frequency is 2.2%. Of our 3 different departments, the neurology department was the most concerned with a frequency of 14.8% compared to all consultations our results are almost similar to a study carried out. In the neurology department of Rabat 2009 which had 12.3% [23], another study in Saudi Arabia had a higher percentage of 25% [24], another study of Bologna A., *et al.* in 2007 at the CHU campus of Lomé Department of Neurology showed a frequency of 19.2% [25]. Men represented 48.7% of our staff, with a female predominance. This appears to be in contrast to most recent studies that have found a slight male predominance. In the study carried out by Cerrato., *et al.* in Italy in 2004, men represented 58% of the population studied [26] The Touré M study in 2007 showed that the male sex represents 53% [27], Another register studied by Kristensen B., *et al.* in 1997 [28] still matched these results with a percentage of 59% of male subjects. However, it is worth noting that a study by Bogousslavsky., *et al.* in the neurology department Switzerland in 1992 [29] demonstrated the opposite with a much larger percentage of women 56%. The Béjat Y and Dijon neurology study in 2011 [30] also showed female predominance. The average age of our patients was 30.59 years, almost identical to that found in the 2004 study of Cerrato MG., *et al.* in Italy [26]. AVC occurs at a younger age than AVC: 29.13 years \pm 16.8 compared to 37.30 years \pm 14.4 in our study, Bogougouslowsky J in Russia in 1990 [31] had 35 years for AVCH and 38 years for COVID. Housewives were the most affected, followed by students in our series with a rate of 28.1%, respectively 21.5%. In a study by Bamako Sangaré S., *et al.* in Mali in 2010, the same finding was made with a percentage of 40%, 19.7% [32]. 60.7% of our patients were from the city of Niamey which means that the neurology department welcomes more neurological patients than the other

departments. The majority of patients were married, 62.2 per cent. Marriage could be a risk factor. The zarma-songhai were the most touched with 52.1%. The majority of patients had consulted a general practitioner before admission, which is 64.7%. This is due to the urban environment and easy access to the doctor. Our work, compared to literature data, highlights the importance of the risk factors of stroke, the first of which is high blood pressure 43.5%. The largest number of patients had at least two 2 risk factors (migraine and sedentarity) with a rate of 35.3%, our results are inconsistent with the majority of studies in which ethylism and tobacco were the predominant risk factors such as the Wollaert G study in France in 2001 [33], this could probably be explained by a low consumption of alcohol and smoking in our regions in the young subject. HTA was more common in patients with COVID-19. Tobacco, obesity, sedation and migraine were more common in patients with IBS. This could be explained by the fact that HTA increases the intracranial pressure that will break the Boucharat and Charcot arterioles which unfortunately do not have substitutes and this is more common in the age subject.

In young subjects the most common cause is the rupture of an aneurysm at the level of a lobe from which the bleeding is always lobar, so the etiology can be the rupturing of an anaerysm by malformation or nicotine. In our series we have a total of one hundred and ninety-nine cases, including 75.6% of COVID, 19.3% of CHD, 4.2% of cerebral thrombophlebitis, 0.8% of arachnoid hemorrhage. This trend is typical because the literature has always a predominance of COVID vs. CHF as in the study by Simon., *et al.* in France in 1996 [35], which showed a 70% predomination of Covid vs. COVid. 58.8% of our patients were admitted within 24 hours of their stroke. This shows that many patients could benefit from thrombolysis when it is available. Such results are found in the majority of studies such as the study of Bologna., *et al.* at CHU campus Lomé 2007 which had a higher percentage of 70% [35]. Osserman and Al in Belgium in 2001 got 98% [36]. In our series with patients admitted for left hemiplegia predominated 20.2%. This does not mean that it was small hemisphere strokes that predominated because we found left hemiplegia in right-handers. 49.6% of patients were known or discovered their HTA during hospitalization. According to the WHO in 1995, the World Health Organization in 1985 [36] 62% of vascular diseases are attributed to high blood pressure. Psaty., *et al.* in the United

States in 1997 [37] demonstrated that controlling blood pressure with antihypertensive therapy significantly reduces the risk of stroke regardless of the severity of HTA. The study reveals that the start mode was brutal every time the classic stroke occurred. Headaches associated with dizziness were the most common functional signs in our patients, with a rate of 28.6%, followed by headaches at 25.2%, vertigo, headache and palpitation at 8.4%. The same symptoms were found in another Ahmed A study in Madagascar in 2002 [38] with some similarities such as a high frequency of headaches, and some differences such as an important rate of consciousness disturbances (42%) while they are rare in our country. The physical signs are largely dominated by hemiplegia, with a predominance of left hemiplexia 20.2% over right hemiplegia 11.2%. A slight prevalence of right hemiplegia 16.8% is observed compared to left 15.1% if aphasia is associated. Aphasia itself appears once in isolation at 0.8%. Facial lesions were 1.7%, pneumogastric injury in 10.1%, hemiplegia associated with aphasia and facial paralysis 4.2%, and monoplegia in 5%. Datie A in Côte d'Ivoire in 2002. [39] had, like us, observed a predominance of attacking the left hemicorp (55%), but with a wider proportion of aphasia (14.2%). Others, such as Kwasa and Lore in Kenya 1990 [40], report an equal distribution of right and left hemispheres. This, to show that the physical signs are also the same, but differ in their proportions according to the studies. Brain DMT is the most performed examination, 100% of cases. This is the basic emergency examination: ideal for the diagnosis between bleeding and ischemia, it is the first intention examination.

The most common anomaly in DMT was hypodensity with 51.3% of cases. In our series, the brain lesions occurred in the sylvian territory in 45.4% while the impact of the vertebrobasilar region was 3.4% on the scanner but one of our patients who was able to make the MRI showed a tight stenosis of the posterior pit. It may be that those patients who were unable to perform the MRI due to lack of resources have posterior lesions. The Cerrato, *et al.* study in Italy in 2004 found a 52% higher percentage of sylvian lesion compared to 36% in the vertebro-basilar region [26]. Rouhart, *et al.* in Paris 1993 [41], in his study carotid damage of 61.3% in proportions comparable to those of our series. But the damage to the vertebrobasilar system in his study was 38.7% significantly higher than that observed in our 0.8%. The same is true for Varona, *et al.* Spain 2007 [42] which had observed 68% of carotid system damage and 32% of cases of vertebrobasilar

system damage, Khan FY in Qatar in 2007 [43], radiological examinations 42.7% of stroke and 40% of carotid injury; in Côte d'Ivoire, in the Cocody hospital centre, 224 patients admitted for COVID were diagnosed in 83.9% of cases (n = 188), and vertebro-basilar impairment in 16.1% of cases (n = 36) 2007 [44]. The damage to the anterior brain had occurred only in 15.1% of our cases, in 3.4% in the posterior territory, in the anterior territory and in the sylvian in 0.8%. The MRI is the reference examination, because the sensitivity and specificity of the MRI are much higher than that of the scanner. However, its real problem is the cost. Only one of our patients was able to realize that it was that allowed us to diagnose an AVCI of the vertebrobasilar territory with as results tight stenosis of the posterior pit. Doppler ultrasound of cervical and intracranial vessels is a necessary study in all cases. In fact, it allows on the one hand to study the intracranial vessels in search of occlusive stenosing lesions, responsible for strokes. It was performed in 58.8% of our patients, and in 10.9% the results were abnormal. On the other hand, the associated transcranial Doppler, allows to verify the permeability and appearance of the Willis Polygon and to assess in particular the consequences of a carotid occlusion for example. This study is increasingly successful and its use is almost systematic in strokes, the young subject Thiebot J France 1994 [45]. We found 3.4% of anemia and 1.7% of hyperleukocytosis that join sepsis-origin strokes. In 1.7% of polyglobulias, these results could lead to a possible hematological stroke, but due to insufficient technical data, these diagnoses could not be confirmed. Of the one hundred and nine cases in our series, the causes of stroke could not be determined in 44.5% of cases, translating the data from the literature. In fact, in most series, the etiological survey remained negative in almost 30% of patients despite a so-called exhaustive assessment. This percentage could go up to 50% in some studies as Leys D France said in 2004 [46]. Such results reflected the difficulty in establishing the etiological diagnosis of stroke in the young subjects. On the other hand, certain etiologies emerged as the most common in most studies. Thus, embologenic cardiopathies followed by aortic dissections were identified as the most common etiologies of strokes in young subjects, as in the study by Kristensen B., *et al.* Sweden in 1997, [28]. In our series we obtained 8.4% of atherosclerosis this is the third cause of stroke in the young adult. Atherosclerosis-related strokes are rare before the age of 30, but increase with age and the presence of risk factors such as smoking, dyslipidemia, diabetes,

high blood pressure (HTA), migraine, and oral contraception. We also recorded 3.4% of cerebral thrombophlebitis.

However, this could not hide the high etiological variability of strokes in young patients, which requires individualized discussion and treatment specific to each clinical situation. It is just remarkable that the incidence of certain etiologies varies depending on the type of survey, the size of the sample and the means of diagnosis used. During our study we found a predominance of the drapanocyte 26% which could be explained by the frequency of this disease in our regions where this pathology is very common. It is not, so to speak, absent in the Mediterranean countries. Indeed, in Saudi Arabia, out of 136 young adults suffering from AVC, Awada., *et al.* in 1992 [24] had observed 3 cases of drapanocytosis. Oral contraception was selected as an etiology in 9.2% of the cases in our series, when there was no cause found (negative balance) and outside of other risk factors. But consideration of contraception is disparate. While Adams and Al in 1995 [47], like Bogoulavssky and al Russia in 1992 [29] do not even mention it as a risk factor, Colarimo., *et al.* in 1994 [48] retain it as etiology in 18.6% of cases, Lanzino., *et al.* Sweden in 1991 [49] in 15.3% of cases and Ducrocq., *et al.* France in 1999 [50] in 3 cases. Bogousslavsky and Regli in 1987 [51], though 65% of the patients were taking or had taken oral contraceptives, did not attribute any cases of COVID to them. One case of COVID is observed in the post perfume period in our series with a negative balance, and no other cause identified. In fact, the hematological changes observed during pregnancy are responsible for an increase in the activity of the coagulation factors and a decrease in the fibrinolytic activity in the Stirling L., *et al.* study in 1984 [49], during the 2nd and 3rd trimesters, with a return to normal within 2 to 3 months. Hormonal changes associated with pregnancy and post-partum are conducive to changes in the structure of the medium of the cerebral arteries [50]. Hemodynamic changes consist of a gradual increase in blood volume and heart rate [51], a decrease in peripheral vascular resistance and during labor, an increase in heart rate and cerebral blood rate. Initial care of young stroke patients is similar to that of older subjects. Thus, the treatment of strokes depends on the etiology, if one can identify it and it joins the treatment for strokes of the elderly subject in the other case. 66.4% of patients in our series had a Glasgow between 11 and 15 this shows that the vast majority of patients had a stable state of consciousness in the neurology department so stabilized in the emergencies.

According to Amarenco P., *et al.* in Paris 1998 [53], Adams Hp., *et al.* United States in 2007 [54]. Lyes., *et al.* in 2004 [46], the NIHSS score allows a prediction of the patient's residual disability after a stroke. A score of less than 10 before the 3rd hour allows to hope for 40% of spontaneous recovery, whereas this is excluded with a score of more than 20. An antihypertensive is prescribed in 58.2% in a Bologna A., *et al.* study in 2007 [25] at CHU Campus in Lomé which is close to 53.8% in our study. In our series, 41.2% of ischemic strokes are treated with anti-platelet aggregates. This practice is consistent with that of Abdelmoumene N., *et al.* in 2002 [55] who found that platelet antiaggregants at a dose of 160-300 mg/day could reduce the mortality rate, disability rate and risk of recurrence of strokes. Mannitol and salt serum are used in 7.6% of cases in our series, with indication of decreased cerebral edema. This practice is consistent with that of Amarenco., *et al.* [52] which proposes mannitol in TICs and decompressive hemicraniectomy in "malignant" sylvian infarction before the 20th hour, which allows a reduction in mortality by 20%. The fever is treated from a threshold of 37.5°C Amarenco., *et al.* [52], which proposes treatment of fever from 37°5 with injectable paracetamol. Almost all of our patients have benefited from a 99.2% physical therapy of our series. Inhalation pneumopathies, epileptic seizures, infections (urinary tract, scarring) and malnutrition are the most common complications mentioned by the staff interviewed.

The life and functional prognosis of stroke in young subjects is better than that of the elderly. The mortality rate in the acute phase (within 30 days) is 1.7%. It is related to cerebral edema in two-thirds of cases, the progress is favourable with minimal to moderate disability that depends on the severity of the initial stroke. Any patient with stroke, regardless of age or stroke etiology, should be treated in a specialized or better neurovascular unit with the presence of qualified medical and paramedical personnel and start rehabilitation as soon as possible [57]. Compared to treatment in a conventional unit, mortality decreased by 20%, mainly by reducing intermittent complications occurring between the first and third week of treatment, especially decubitus complications and cardiovascular disease. Functional prognosis is improved with reduced disability. The average hospitalization duration was 7 to 14 days for the majority of patients, or 50.4%. Balougou A., *et al.* in 2007 [25] had DMS of 19.9 years. They also DMS 23.1 days [32]. DMS in case of AVC is 10.57days ± 6,054 extreme: 2days and 30days DMS in case of AVC is 12,04 days ± 5,927 extreme: 4days and

25days The difference in duration of stay between AVCI and AVCH is due to the flashing recurrence of AVCH within the first 30 days of hospitalization. Grimmonprez JC in France [58] Received 11.1days as DMS. the death rate in our study is 7.6% with a loss of vision rate of 46.2%. So probably a high Mortality Rate Bougousslavsky J [31] obtained a mortality rate between 1.5% and 7.3% Frid AM., et al. had obtained a higher rate of 8.5%. The mortality rate in our series and in other African works is higher than in the European series due to a transfer of medicalised in the specialized service with a technical plateau at the right level and early and adequate care in European countries.

Conclusion

The stroke does not spare the young subject, long considered a disease of the third age. The strokes of the young person are different from those of the elderly person by their multiple etiologies, hence the hard research of the etiology. The absence of a previous study on the same topic is regrettable. It would have helped to make the point through a comparison.

But From an epidemiological point of view, the incidence of strokes in the young person in the neurology and cardiology departments of the Niamey National Hospital and the National Centre for Drépanocytaire Reference is similar to that of a developing country. And the importance of risk factors is highlighted, and their frequent association. At this level, regional awareness-raising campaigns could play a beneficial role. As far as supplementary examinations are concerned, they testify to a modern structure that meets Western standards.

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