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Stroke in Young Women: Experience of the Neurology Department of Ignace Deen Hospital, Guinea

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Abstract

Introduction: The prevalence of stroke is increasing among women of working age. The aim of this study was to describe the epidemiological, clinical, and prognostic aspects of stroke in young women in Guinea. **Material and Methods:** This was a prospective study of one (1) year duration at the Neurology Department of Ignace Deen Hospital in Conakry on women aged between 15 - 50 years who had a stroke confirmed by brain imaging. Epidemiological, clinical, para clinical and prognostic characteristics were collected. **Results**: In this study, 58 patients were included, with an average age of 43.3 years. The most common risk factors were hypertension (72.4%) and HIV (37.9%). The average NIHSS was 9.9. According to the type of stroke, 39 patients (67.2%) had an ischemic stroke; among them, 10/39 patients (25.6%) were due to infectious source, 12/39 patients (30.8%) had an undetermined source, 8/39 patients (20.5%) had embolic heart disease, 5/39 patients (12.8%) had small vessel disease due to hypertension, 3/39 patients (7.7%) had sickle cell disease. Intracerebral hemorrhage was found in 12 patients (20.6%). 6 of these patients (10.3%) had hypertensive microangiopathy as the etiology. Four patients (6.9%) had subarachnoid hemorrhage, of which 3 patients were due to ruptured aneurysms. Three cases (5.2%) of cerebral venous thrombosis were noted. Complications were inhalation pneumonia (27.6%) and urinary tract infections (19%). Seven cases (12.1%) of death were recorded, 5 of which were in hospital, the other two patients between 1 and 6 months. The average modified Rankin Score (mRS) at 6 months was 3.1, and 16 patients (27.6%) had a favorable outcome (mRS < 3). **Conclusion:** Stroke in young women is responsible for high morbidity and mortality and requires control of risk factors to

reduce its incidence. Infectious causes were dominant in this study, with a high proportion of patients living with HIV. Strengthening awareness campaigns screening and the treatment of these infections and cardiovascular risk factors would reduce the occurrence of stroke in this population.

Keywords

Stroke, Young Women, HIV, Conakry

1. Introduction

Stroke usually occurs in older adults. Four out of five people admitted to hospital with a stroke are over 65 years of age [1]. Epidemiological studies indicate an increasing incidence in young adults, with a significant difference between the sexes [2]. It is estimated that about 10% of ischemic strokes occur in people under 50 years of age [2]. The annual incidence rate is 7 - 17 per 100,000 for populations ≤ 45 years or ≤49 years [3] [4]. Some studies have shown that women outnumber men under 30, 35 or 44 years of age [2]. Projection studies predict an increase in stroke mortality by 2050 that is greater for women 30% higher than for men [5].

Stroke in young women poses a double problem; on the one hand, one-third of strokes occur in people under 65 years of age, who are therefore in work at the time of the stroke [4]. On the other hand, mortality in this age group (15 - 45 years) is relatively high in developing countries, at over 30% compared to 20% in developed countries [6]. Stroke has serious consequences, particularly in young adults, due to severe sequelae such as physical disability, vision loss, cognitive impairment and fatigue that can affect driving and physical mobility, social life and quality of life. In addition, stroke has a considerable socio-economic impact due to lost years of work and high health care costs [7].

The aim of this study was to contribute to improving knowledge of stroke in young girls.

Specifically:

- determine the frequency of strokes in girls in the neurology department;
- determine socio-demographic characteristics;
- describe the clinical and paraclinical aspects of stroke in this group of patients;
- describe the therapeutic profile of the girl's strokes.

2. Material and Methods

This was a prospective descriptive study lasting one (1) year, from February 1, 2021, to January 31, 2022, carried out at the Department of Neurology of Ignace Deen Hospital of Conakry. Stroke was defined as a focal or global neurological deficit lasting more than 24 hours, which can lead to death, without any apparent cause other than a vascular origin [8]. The study focused on young women between 15 and 50 years of age with an imaging-confirmed stroke. Those under the

age of 15 and over the age of 50 were excluded from the study. For each patient, the following data were studied:

Epidemiological data: age, education level, professional category, cardiovascular risk factors (hypertension, diabetes, HIV, smoking, alcohol, oral contraceptives, sedentary lifestyle).

Clinical data: admission time, neurological examination results, complications. The severity of stroke was assessed using the NIHSS (National Institute of Health Strokes Scale).

Paraclinical data: Brain CT and/or MRI were performed in all patients to confirm stroke. ECG was performed in all patients and abnormalities were noted. For patients with cerebral infarction, abnormalities on ultrasound of the heart and neck vessels were recorded. Angioscan/MRI was performed to look for vascular malformation. Cerebrospinal fluid analysis was performed in all patients who did not present a contraindication to lumbar puncture. The hemostasis assessment as well as the search for infectious causes (syphilis, tuberculosis, HIV) were systematic. The TOAST (Trial Org Acute Stroke Treatment) was used to classify ischemic stroke etiologies.

Intra-hospital follow-up was done on a multi-day basis to look for complications (inhalation pneumonia, sores, urinary tract infection, deep vein thrombosis of the inferior limbs, pulmonary embolism). The degree of disability was assessed by the modified Rankin Score (mRS) at the admission, at 1 month and at 6 months. Any death during this period was noted, and a favorable outcome was considered when the mRS was <3.

Data analysis was done by Epi-Info™ 7.1.5, a database and statistics program for public health professionals (CDC, Atlanta, Georgia, United States). The average was expressed for quantitative variables, and qualitative variables were expressed at frequency.

For ethical considerations, the Ignace Deen ethics committee approved the study. The identity of the patients as well as the confidentiality of the information was preserved.

3. Results

During this study, stroke represented 89.3% (540 over 605 patients) of admissions in the neurology department and involved young women in 9.6%, *i.e.*, 58 patients. The average admission time was 2.5 ± 1.5 days (extremes: 1 and 14 days). Thirty-nine patients (67.2%) lived in Conakry, compared to 19 patients (32.8%) in the countryside. The average age was 43.3 ± 7.8 years (extremes: 16 and 50 years), 30 patients (51.7%) were aged between 36 and 45 years, 20 patients (34.5%) were aged between 46 and 50 years and 6 patients (10.3%) were aged between 26 and 35 years.

Thirty-two of the patients (55.2%) had no education. Forty-six patients were married (79.3% of cases). Twenty-eight patients (48.3%) were housewives. Hypertension was the most common risk factor present in 42 patients (72.4%), HIV was

present in 20 patients (37.9%), and diabetes in 20 patients (34.5%). Other risk factors were sedentary lifestyle (13.8%), obesity (10.3%) and previous stroke (3.5%) (Table 1).

Table 1. Socio-demographic characteristics.

Socio-demographic characteristics	Number (N = 58)	Percentages (%)
Age		
16 - 25	2	3.4
26 - 35	6	10.4
36 - 45	30	51.7
46 - 50	20	34.5
Average age: 43.3 ± 7.8 years (Extremes: 16 and 50 years)		
Levels of education		
None	32	55.2
Primary	9	15.5
Secondary	11	19
Higher	6	10.3
Socio-professional categories		
Unemployed	2	3.4
Tradeswomen	16	27.7
Pupil/Student	2	3.4
Civil servant	10	17.2
Housewife	28	48.3
Marital status		
Single	8	13.8
Married	46	79.3
Widows	4	6.9
Cardiovascular risk factors		
Hypertension	42	72.4
HIV	22	37.9
Diabetes	20	34.4
Sedentary lifestyle	8	13.8
Obesity	6	10.3
Previous stroke	2	3.5

On clinical examination, the average NIHSS on admission was 9.9 ± 3.2 (extremes: 1 and 14), and 86.2% of patients were conscious and oriented on admission with an average Glasgow score of 12.2 ± 2.8 (extremes: 9 and 15). Hemiplegia

and central facial paralysis were the most common signs found, *i.e.*, 48 patients (82.7%) and 42 patients (72.4%) respectively. Eight patients (13.8%) had a meningeal syndrome, 9 patients (15.5%) developed epileptic seizures, and 10 patients (17.3%) had phasic disorders.

According to the type of stroke, 39 patients (67.2%) had an ischemic stroke; among them, 10/39 patients (25.6%) were due to infectious source (4 patients with brain tuberculosis, 4 patients with neurosyphilis and 2 patients with neurocysticercosis), 12/39 patients (30.8%) had an undetermined source, 8/39 patients (20.5%) had embolic heart disease (4 patients with auricular fibrillation, 3 with rheumatic valve diseases and one patient with dilated cardiomyopathy), 5/39 patients (12.8%) had small vessel disease due to hypertension, 3/39 patients (7.7%) had sickle cell disease and 1/39 patient (1.7%) had atherosclerosis.

Intracerebral hemorrhage was found in 12 patients (20.6%), 6 of these patients had hypertensive microangiopathy, 2 patients had ruptured vascular malformation. Four (4) patients (6.9%) had subarachnoid hemorrhage, of which 3 patients (5.1) were due to ruptured aneurysms, and 1 patient (1.7) was due to ruptured arteriovenous malformation. Three cases (5.2%) of cerebral venous thrombosis were noted (Table 2).

Table 2. Types and etiologies of ischemic stroke.

Ischemic stroke	Number	Percentages (%)
Infectious source	**10**	**25.6**
Brain tuberculosis	4	10.2
Neurosyphilis	4	10.2
Neurocysticercosis	2	5.1
Embolic heart disease	**8**	**20.5**
Auricular fibrillation	4	10.2
Rheumatic valve diseases	3	7.7
Dilated cardiomyopathy	1	2.5
Atherosclerosis	**1**	**2.5**
Sickle cell disease	**3**	**7.7**
Small vessel disease	**5**	**12.8**
Undetermined source	**12**	**30.8**
Total	**39**	**100**

The average length of hospitalization was 11 ± 5 days. Complications during hospitalization were inhalation pneumonia in 16 patients (27.6%), urinary tract infections in 11 patients (19%), sores in 8 patients (13.8%) and lower limb venous thrombosis in 2 patients (3.5%). Seven deaths (12.1%) were recorded, 5 of which (8.6%) were in hospital. The mRS on admission was 3.9 ± 0.4 (extremes: 1 and 4), and only 2 patients (3.4%) had an mRS < 3. At 1 month, the average mRS was 3.7

± 0.6 (extremes: 1 and 6) and 7 patients (12.1%) had a favorable outcome (mRS < 3). Patients were reviewed at 6 months, the average mRS was 3.1 ± 1.3 (extremes: 0 and 6) and 16 patients (27.6%) had a favorable outcome (mRS < 3) (Table 3).

Table 3. Prognosis variables for stroke.

Variables	Number (N = 58)	Percentages (%)
Duration of hospitalization		
<15	37	63.8
[15 - 21]	13	22.4
<21	8	13.8
Average duration: 11 ± 5 days (Extremes: 5 - 21)		
Complications		
aspiration pneumonia	16	27.6
Urinary tract infection	11	19
Sores	8	13.8
Venous thrombosis of the lower limbs	2	3.4
None	**21**	**36.2**
mRS at admission		
mRS < 3	2	3.4
mRS = [3 - 5]	56	96.6
Average = 3.9 ± 0.4 (Extremes: 1 and 4)		
mRS at 1 month		
mRS < 3	7	12.1
mRS = [3 - 5]	46	79.3
mRS = 6:Death	5	8.6
Average = 3.7 ± 0.6 (Extremes: 1 et 6)		
mRS at 6 months		
mRS < 3	16	27.6
mRS [3 - 5]	35	60.3
mRS = 6:Death	7	12.1
Average: 3.1 ± 1.3 (Extremes: 0 et 6)		

4. Discussion

Stroke in young people is on the increase worldwide, with devastating functional and also professional consequences. The study's limitations were the small size of our sample, the lack of a complete technical platform for complete etiological research (anti-phospholipid antibody research, genetic tests) and the absence of recanalization therapy (thrombolysis, thrombectomy). The average age of our population (43.3 years) is lower than that of Latou *et al.* [9] in Congo, who in their

study found an average age of 46.5 [26 and 55 years]. Mahflouch *et al.* [10] in Tunisia found an average age of 38.9 years. However, our result is higher than that of Leys *et al.* [11] who found an average age of 31.5 years [9 and 45 years] in France. The admission time of the patients (2.5 days) is higher than that reported by a Senegalese cohort, in which the time to care was less than 3 hours in 21% of cases [5]. This long admission delay in the Guinean context can be explained by the fact that brain CT scan facilities are only located in Conakry, and therefore any patient with a stroke outside of Conakry has to travel many kilometers to reach a CT scan center. This is common in many underdeveloped countries and partly explains the long delay between stroke onset and hospital admission, which exceeds 90 hours in Guinea [12].

Professionally, housewives represented 48.3% of the patients, and more than half (55.2%) of them had no education. These results are in agreement with those found by Daddah *et al.* [5] who found 67.3% to be housewives and 13.5% to have a formal activity with an overall low level of education. These results reflect the low level of female education in our context and the difficulties women face in finding work.

Despite the low prevalence of HIV in Guinea (0.67 per 1000 inhabitants) [13]. 37.9% were HIV-positive. Indeed, young people living with HIV are often victims of stroke and stroke may represent the initial presentation of HIV infection [14]. Although HIV infection is endemic in Africa, few authors have addressed this association between stroke and HIV [5]. In Malawi (where the national HIV prevalence is about 10%), HIV is the main risk factor, with a population-attributable fraction of 46% in younger populations and remains significant in older populations (population-attributable fraction 8%) [15]. In Togo, the prevalence of HIV infection among female stroke patients was 8.1% [16]. Other risk factors are also mentioned, such as migraine, oral contraceptives, pregnancy and postpartum [17].

The high proportion of infectious causes in this study is probably due to the tropical context, with many of these infections being endemic. Ischemic stroke is sometimes a circumstance for the discovery of many central nervous system infections. Indeed, many infectious agents have been implicated as a cause of stroke through different mechanisms. Among the infectious causes of tuberculosis, Syphilis has long been identified as a cause of stroke in young people [12]. The lack of an adequate technical platform for etiological research explains the high proportion of undetermined causes in this study. Stroke severity (average NIHSS of 9.9) is lower than in the major thrombolysis and thrombectomy trials in developed countries [18] but is consistent with the average NIHSS levels in sub-Saharan series [12]. This difference in NIHSS score in stroke therapeutic trials in developed countries and NIHSS levels in underdeveloped countries could be explained by a selection bias of the most severe cases in therapeutic trials or by the fact that most severe cases in underdeveloped countries may not reach the hospital due to lack of accessibility to the hospital in terms of distance, cost and medical transport

[19]. Ndouba *et al.* [14] in Cameroon found in their study that 73.1% of their patients had a moderate stroke with an NIHSS score between 5 and 15.

Complications that occurred during hospitalization were inhalation pneumonia (27.6%) and urinary tract infections (19%), sores (13.8%) and venous thrombosis of the lower limbs (3.4%). The proportion of death in our series (12.1%) is lower than that of Daddah *et al.* [5] who recorded 11 cases of death, a rate of 21%. Indeed, death from stroke during the first week is mainly due to acute cerebrovascular complications such as hemorrhagic transformation of a cerebral infarction or cerebral involvement due to peri-lesional edema [20]. The patients hospitalized at the Neurology department of Ignace Deen had, for the most part, already survived the first few days and were entering the period following the onset of the stroke where medical complications are responsible for a significant proportion of death. Neuropathological studies have shown that stroke deaths after the first week were due to pulmonary embolism in 30%, inhalation bronchopneumonia in 27% and heart disease in 37% of autopsied cases [11].

Patients with a favorable outcome (mRS < 3) were lower than Wasay *et al.* [21] who reported 83% of patients with an mRS between 0 and 3, and 17% of patients with an mRS of 4. A study on functional recovery after stroke, which included the largest sample of young stroke patients, showed that age was a significant inverse predictor of good functional outcome at 3 months post-stroke, irrespective of clinical type or severity, and that younger patients are more likely to be sent back home than older patients [22].

This relatively low severity of stroke may be explained by the fact that, in Guinea, most severe cases probably don't reach hospital due to the lack of hospital accessibility in terms of distance, cost and means of medical transport. Indeed, a survey carried out at the Ignace Deen Neurology Department in 2014 revealed that only 2% of stroke patients arrived by ambulance, 46% came by public transport, 27% by private car while the rest had to find other means. This lack of accessibility is also reflected in the time elapsed between the onset of stroke and admission to neurology, which is closer to 4 days. These facts, combined with the lack of money to support the high healthcare costs associated with severe illness in Guinea, suggest that a significant proportion of severe stroke cases remained and/or died at home or along the way. Paradoxically, the long delay between stroke onset and admission to neurology is also likely to explain the low rate of stroke mortality in our study.

5. Conclusion

Stroke in young women is a real public health problem because of its socio-economic consequences but also because of the disability it causes. This has a major impact on professional and family life. In this population, infectious causes were dominant, and more than a quarter of the patients had favorable outcomes. Strengthening awareness campaigns and screening for these infections, as well as treating other risk factors, would reduce the occurrence of stroke in this population.

6. Recommendation

Early consultation in a health facility at the slightest neurological sign, psychosocial support for stroke patients, routine medical check-ups, implementation of a program to monitor and combat modifiable risk factors, and subsidization of the cost of additional examinations for etiological orientation and better management.

Create a neurovascular unit for training, research, and stroke management.

Authors' Contributions

All authors contributed to the design, analysis, and interpretation of the information and gave final approval for the publication of the version.

Conflicts of Interest

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

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