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ОРИГИНАЛЬНОЕ ИССЛЕДОВАНИЕ
ORIGINAL RESEARCH

Stroke risk factors in Bujumbura

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Abstract. *Relevance.* Stroke is a public health problem, with over 90 % of cases worldwide attributable to a combination of individual clinical or behavioural risk factors, which are generally classified as non-modifiable and modifiable risk factors. *The aim* of this study was to determine the stroke risk factors prevalent among stroke patients in Bujumbura, the economic capital of Burundi. *Materials and Methods.* This was a descriptive and prospective study performed over a 6-month period from February to August 2020. 71 stroke patients who were hospitalized for a stroke confirmed by cerebral CT scan in the two teaching hospitals of Bujumbura were collected. *Results and Discussion*. Stroke risk factors were frequently found among stroke patients in Bujumbura. In fact, 91.55 % had at least one risk factor for stroke, with an average of 2.86 per patient. These factors are mainly cardiovascular (91.62 %), with hypertension accounting for the largest share (46.48 %), followed by regular alcohol consumption (33.80 %). Age was the most common non-modifiable risk factor in these patients, with 73.25 % aged over 50 and an average age of 59.87. There was a predominance of male patients, the sex ratio was 1.29. As in the literature, ischemic stroke predominated (69.01 %), while the recurrence rate was 14.6. Other risk factors that were found to be significant were sedentary lifestyle (26.76 %), diabetes (16.90 %), obesity (8.45 %) and smoking (5.63 %). The positive HIV/AIDS seroprevalence rate was 8.5 %, whereas the national prevalence rate was 2.97 %. *Conclusion.* Risk factors for stroke are found in the large majority of patients in Bujumbura. They are diverse, but are mainly dominated by cardiovascular pathologies, in particular hypertension.

Key words: stroke, risk factor, hypertension

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Introduction

Stroke is a major public health problem worldwide because of its frequency, mortality, residual physical and cognitive disabilities, and the high cost of its management [1]. More than 90 % of observed stroke cases worldwide are attributable to a combination of individual clinical or behavioral risk factors. These are generally classified as non-modifiable and modifiable risk factors [2,3].

Sub-Saharan Africa has the highest incidence, prevalence, and lethality of stroke in the world, but detailed characterization of stroke risk factors on this continent remains challenging [4].

In Burundi, we do not have a national stroke registry, but some partial studies already show that stroke is a reality in our country. In 2009, a study conducted at KTH reported a stroke hospitalization rate of 2.3 % and a poor prognosis with a mortality rate of 38.8 % [5]. However, there is no neurovascular unit in our country, so curative management of stroke has not yet been started.

In this context, it would be important to focus efforts on preventive management of stroke, which would undoubtedly involve good upstream management of the various risk factors, especially since 90 % of strokes are attributable to risk factors that can be modified by a better lifestyle [6]. It is with this aim that we performed this study to determine the epidemiology of risk factors among stroke patients in Bujumbura.

Materials and methods

This is a descriptive and prospective study that focused on stroke patients who were hospitalized in a 6-month period from February to August 2020. It was conducted in the only two teaching hospitals located in Bujumbura, the economic capital of Burundi. These are the Kamenge teaching hospital and the Kamenge military hospital (KMH). In addition, these two hospitals were chosen for our study because they house the few neurologists who practise in our country, which means that most stroke patients should be hospitalized there.

Confirmation of stroke by cerebral CT scan was the only inclusion criterion, because MRI was not yet available throughout the country at the time of the study. Data were collected from patients and their medical records after informing them voluntary consent to participate in the study according to the Helsinki Declaration of the World Medical Association (WMA Declaration of Helsinki — Ethical Principles for Medical Research Involving Human Subjects, 2013) and personal data processing.

After collection, the data were entered and analyzed on the computer using Epi-info software version 7.2.6.

Results and discussion

The probability of getting a disease varies according to certain parameters that constitute the risk factors. In our study, out of 71 stroke patients, 65 of patients (91.55 %) had at least one risk factor. It was a single risk factor in 8.45 % of patients, 2 factors in 28.17 %, 3 risk factors in 29.58 %, and more than 3 risk factors in 25.35 %. The average stroke risk factor was scored as 2.86 per patient. These results show that stroke patients in Bujumbura accumulate its risk factors since they even exceed the average of 1.6 per patient recorded in the Swedish stroke registry in 2014 [7] and by far the 1.23 recorded in Algeria in 2016 [8]. Furthermore, in a study done in France in 2016, all patients had at least

one risk factor, and 77.7 % of patients had more than two stroke risk factors [9].

Among these risk factors for stroke found in this study, age was the most important non-modifiable factor. Indeed, age is the greatest determinant of stroke, and the risk of stroke doubles every decade beyond the age of 55. It can also be considered as a marker of the duration of exposure to other risk factors [10]. The mean age found in our stroke patients was 59.87 years, and 74.65 % were older than 50 years; the youngest patient was 2 years old, the oldest was 103 years old. This mean age approaches closely to 61.38 years; found in a stroke study conducted in our country in 2012 [5]. Almost the same average age was also found in other studies done in black Africa such as in Togo (58.66 years) [11]; in Ivory Coast (60 years) [12] and the one conducted in Ghana and Nigeria in 2018 which found an average age of 58.4 years [4]. However, this average age is lower than that of Western patients where Bezanson C. in France found an average age of 73 years [13]. This difference can be explained by the youth of the African populations, of which Burundi is one.

Male patients accounted for 56.33 % in our study, a sex ratio of 1.29. The incidence of stroke is higher in men than in women, but this difference decreases with age [14]. Although this male predominance of stroke patients has been described in the literature for a long time [15], there are studies that also find a female predominance, such as that of N'goran Y. and colleagues in Abidjan with a sex ratio of 0.44 [12] or Balaka A. and colleagues in Togo with a sex ratio of 0.66 [11].

Table

Distribution of stroke risk factors

Risk factor		Frequency	Percent
Cardiovascular risks	Over 50 years old	53	74,65 %
	Arterial hypertension	33	46,48 %
	Regular alcohol consumption	24	33,80 %
	Sedentality	19	26,76 %
	Diabetes	12	16,90 %
	Personal history of stroke	10	14,08 %
	Familial history of stroke	8	11,27 %
	Obesity	6	8,45 %
	Heart valve disease	5	7,04 %
	Smoking	4	5,63 %
	Atrial fibrillation cardiac arrhythmia	3	4,23 %
	Dyslipidemia	3	4,23 %
	Dilated cardiomyopathy	3	4,23 %
	Atheromatous disease	2	2,82 %
Others risks	Use of antiplatelet drugs	7	9,86 %
	HIV/AIDS	6	8,45 %
	Oestroprogestogenic contraception	2	2,82 %
	Sickle cell disease	1	1,41 %
	Migraine	1	1,41 %

In our study, ischemic stroke was diagnosed in 69.01 % of patients, 11.27 % had a family history of stroke and 14.80 % of strokes were recurrent. In the literature, the risk of stroke recurrence is still significant. It is estimated at 10 % during the first year and 20–30 % at 5 years [16]. Our results are similar to those of N'goran Y. and colleagues [12] in Abidjan who found in their study that 15.6 % of strokes were recurrent.

The cardiovascular risk factors alone accounted for 91.62 % and were largely modifiable. Arterial Hypertension was the main modifiable risk factor identified in 46.48 % of patients. All studies on stroke risk factors have long agreed on the primary role of arterial hypertension in the event of this disease, although the statistics may vary from one study to another. Thus, Balaka A. and colleagues in Togo found that 67.12 % of stroke patients had arterial hypertension (11), and more than that; Gombet T.R. and colleagues in Congo Brazzaville (17) and N'goran Y. and colleagues in Ivory Coast (12) found 85 % and 86.4 % respectively.

Regular alcohol consumption was the second modifiable risk factor found in our study at 33.80 %. By the way, the relationship between alcohol consumption and stroke risk is biphasic. High levels of alcohol consumption increase the relative risk of stroke, whereas low to moderate alcohol consumption may be protective against the event of a global or ischemic stroke [18]. Other authors have also found alcohol consumption in stroke patients but at varying rates. Thus, in Mali, Damorou F. and colleagues found it in 31.8 % of patients [19]; in Togo, Balaka A. and colleagues found it in 56.16 % [11]; but in Congo Brazzaville, Gombet T.R. and colleagues found that only 5 % of patients consumed alcohol [17].

Sedentary lifestyle (26.76 %), diabetes (16.90 %), obesity (8.45 %) and smoking (5.63 %) are also modifiable risk factors for stroke that were also found in our study at significant rates. These risk factors are often cited in other studies. For example, in a study done in Ghana and Nigeria in 2018, these factors are also listed in the top eleven risk factors associated with stroke occurrence [4]. They are more present in the patients of a Guinean study where Condé K. and colleagues found that 31.3 % of the patients were diabetic and 62.0 % had abdominal obesity [20].

HIV/AIDS and its antiretroviral treatment are associated with a high risk of cardiovascular disease such as stroke [21]. For a national prevalence of 2.97 %, in our study, 8.5 % of stroke patients were HIV positive; this prevalence was 7.5 % in a previous study performed in our country [5]. This prevalence is comparable to 8.1 % found by Fiawoo M. in patients with stroke in Togo with a national prevalence of 2.9 % [21].

Study Limitations

During the 6 months of the study, in two teaching hospitals, we collected only 71 patients because not all suspected stroke patients were able to pay for a CT scan. Some risk factors would be less identified because the complementary examinations to find them are insufficiently done because of the lack of financial means of the patients, or are not available at the hospital at all.

Conclusion

The risk factors for stroke are identified in the great majority of patients suffering from this pathology in Bujumbura and their frequency is alarming. Most of these factors are of cardiovascular origin and are, however, modifiable. Their adequate management will help to reduce the morbidity and mortality related to stroke in Burundi, where thrombolysis is not yet practiced.

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Факторы риска инсульта в Бужумбуре

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Аннотация. *Актуальность*. Инсульт является проблемой общественного здравоохранения: более 90 % случаев во всем мире обусловлены сочетанием отдельных клинических или поведенческих факторов риска, которые обычно классифицируются как немодифицируемые и модифицируемые факторы риска. *Целью* этого исследования было определение факторов риска инсульта, распространенных среди пациентов с инсультом в Бужумбуре, экономической столице Бурунди. *Материалы и методы.* Это было описательное и проспективное исследование, проводившееся в течение 6-месячного периода с февраля по август 2020 года. Была собрана информация о 71 пациенте с инсультом, госпитализированных по поводу инсульта, подтвержденного компьютерной томографией головного мозга, в двух учебных больницах Бужумбуры. *Результаты и обсуждение.* Факторы риска инсульта часто обнаруживались среди пациентов с инсультом

в Бужумбуре. Фактически 91,55 % имели по крайней мере один фактор риска инсульта, в среднем 2,86 на пациента. Эти факторы в основном сердечно-сосудистые (91,62 %), при этом наибольшая доля приходится на гипертонию (46,48 %), за которой следует регулярное употребление алкоголя (33,80 %). Возраст был наиболее частым немодифицируемым фактором риска у этих пациентов: 73,25 % были в возрасте старше 50 лет и средний возраст 59,87 лет. Преобладали пациенты мужского пола, соотношение полов составило 1,29. Как и в других научных исследованиях, преобладал ишемический инсульт (69,01 %), а частота рецидивов составила 14,6. Другими факторами риска, которые оказались значимыми, были малоподвижный образ жизни (26,76 %), диабет (16,90 %), ожирение (8,45 %) и курение (5,63 %). Положительный уровень серологической распространенности ВИЧ/СПИДа составил 8,5 %, тогда как общенациональный уровень распространенности составил 2,97 %. *Выводы.* Факторы риска инсульта обнаруживаются у подавляющего большинства пациентов в Бужумбуре. Они разнообразны, но преимущественно преобладают сердечно-сосудистые патологии, в частности артериальная гипертензия.

Ключевые слова: инсульт, фактор риска, артериальная гипертензия

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