Ischemic Cortical Stroke in a Kenyan Referral Hospital

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Abstract

Background: The pattern of stroke displays ethnic and geographical variations. In Sub-Saharan Africa there is scarcity of data from Eastern and Central Africa.

Objective: To describe the characteristics of patients with ischemic cortical stroke in a Kenyan referral hospital.

Study design and set up: Retrospective study at Kenyatta National Hospital, Nairobi Kenya.

Patients and methods: Records of adult black Kenyan patients seen with ischemic cortical stroke at Kenyatta National Hospital, Nairobi, Kenya between January 2007 and December 2011 were examined for age, sex, site, comorbidities and outcome. Only files with complete data were included. Data were analyzed by SPSS version 17.0 for Windows and presented in tables and bar charts.

Results: Three hundred and seven cases of ischemic cortical stroke were analyzed. Mean age was 54.7 years, with 20.6% of cases occurring below 40 years. The male: female ratio was 1:1.2 with female predominance in all age groups. Brain regions most commonly affected were fronto-parietal (32.8%) and parietal (31.6%), while 11.6% involved extensive regions of the cerebral cortex. Predominant single comorbidities were hypertension (64.1%), smoking (19.2%), alcohol (13.4%), HIV infection (6.8%) and bacterial infections (6.8%). Multiple risk factors were implicated in 42.4% cases. Two hundred (65.1%) suffered paralysis; 70 (22.8%) clinically recovered and 37 (12.1%) died within 90 days.

Conclusion: Ischemic cortical stroke occurs in young individuals in over 20% of the study population and is female predominant. Hypertension, cigarette smoking and infections including HIV are the leading comorbidities, and it causes high morbidity. Control measures comprising regulation of blood pressure, reduction of smoking and prudent management of infections should be instituted from early in life.

Keywords: Cortical stroke; Ischemic; Kenya

Introduction

Pattern of stroke varies between and within countries depending on ethnicity and/or risk factors [1-3]. In Sub-Saharan Africa, data predominantly from Western and Southern Africa indicate high and steadily increasing rates of stroke affecting younger individuals [4,5]. A recent review of 19 studies from 10 African countries reveals that the burden of stroke is high and continues to increase [6]. Indeed, recent reports predict a looming stroke epidemic in Sub – Saharan Africa and call for urgent action [7]. In this region, including in Kenya, it constitutes a significant cause of morbidity and mortality, considerably affecting quality of life [8-12]. Preliminary reports indicate that while elevated blood pressure may be a major determinant of stroke in the region, there are high rates of strokes related to other causes such as smoking, diabetes mellitus, obesity and infections [13,14]. In Kenya, hypertension is an established problem [15,16]. Accordingly, increase in stroke is imminent. To curtail it, data on the pattern is needed to inform prevention and management strategies, but are largely lacking. This study therefore examined the characteristics of black adult Kenyan patients with ischemic cortical stroke attending a regional referral and teaching hospital.

Patients and Methods

This was a retrospective study done at Kenyatta National Hospital (KNH) in Nairobi, Kenya. This is an 1800 bed capacity level VI Eastern and Central African regional referral and teaching hospital. It has an annual inpatient and outpatient turnover of 80,000 and 500,000 respectively, with over 10 neurologists, 10 neurosurgeons and 5 neuropsychiatrists. Ethical approval for the study was granted by the Kenyatta National Hospital/University of Nairobi – Ethics and Research

Committee (KNH/UoN-ERC). Records of black adult patients aged 18 years and above with a diagnosis of cortical stroke during a five year period extending from January 2007 to December 2011 were retrieved from the hospital registry. They were divided into male and female, and each sex further categorized into 8 age groups starting at 18 years: under 20, 20-30, 31-40, 41-50, 51-60, 61-70, 71-80, and over 80 years. Each of the groups was analyzed for site of lesion in the affected cerebral lobe, comorbidities and outcome after three months. Outcome was categorized as paralysis, clinical recovery or death. Only cases with complete records of these parameters were included in the study. The following cases were excluded: incomplete or incoherent history with respect to age, gender, anatomical localization, comorbidities; lesions not localized; lacunar and brain stem lesions; intracranial space occupying lesions; head injury, cerebral edema; transient ischemic attacks. Data obtained were analyzed by SPSS version 17.0 (Chicago Illinois) for Windows, at 95% confidence interval; and presented in tables and bar charts.

Results

Three hundred and seven five cases of ischemic cortical stroke were

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retrieved out of 81,531 hospital admissions. Sixty eight were excluded for incomplete records (21), vague history (14), poor localization (11), lacunar / brainstem lesions (18), and head injury (4). Three hundred and seven cases were analyzed. These strokes were diagnosed on the basis of clinical presentation of paralysis, aphasia and headache combined with CT scan and angiographic findings.

Anatomical distribution of lesions

Fronto-parietal region was the one most commonly affected (32.5%) followed by parietal (31.0%) and frontal (14.6%) (Figure 1). This indicates that the territory of middle cerebral artery was the most affected.

Age and gender distribution

The mean age was 54.72 ± 16.8 years (range (18-83 years) with a peak between 51–60 years. Sixty eight (22.1%) individuals were aged 40 years and younger. 39.4% of them were below 50 years.

The male: female ratio was 1:1.2. Female predominance was maintained in all the age groups between 20 and 80 years (Figure 2).

Comorbidities

Most common comorbidities were hypertension (64.1%), smoking (19.2%), infections (13.6%) and alcohol consumption (13.4%). Many patients (42.4%) presented with more than one comorbidity, notably hypertension and smoking (14.1%), hypertension and alcohol consumption (7.8%), hypertension and infection (14.5%); hypertension, smoking and diabetes mellitus (2.3%). Diabetes mellitus, renal disease, auto immune disorders, sickle cell disease and connective tissue disorders were implicated in a few cases each (Table 1).

Outcome

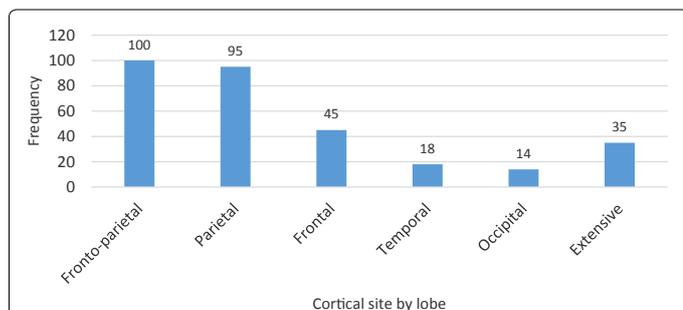By the end of 90 days, majority of the patients (65.1%) were still

Figure 1: Anatomical distribution of cortical lesions among stroke patients in a Kenyan referral hospital.
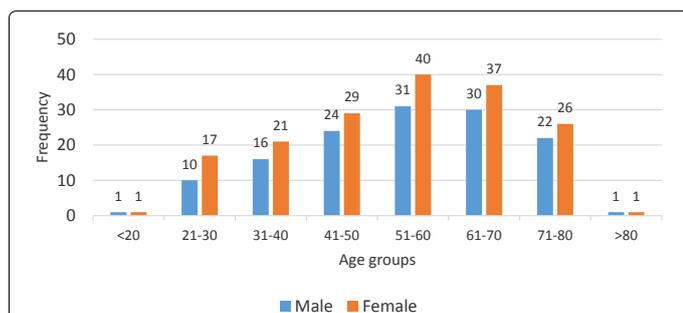

Figure 2: Age and gender distribution of patients with ischemic cortical stroke in a Kenyan referral hospital.

Comorbidity	Frequency		(%)	
	M	F		
Hypertension	96	116	212	(64.1)
Smoking	35	29	64	(19.2)
Alcohol	24	24	44	(13.4)
HIV	9	14	23	(6.8)
Other infections	8	15	23	(6.8)
Diabetes Mellitus	7	5	12	(3.8)
Renal disease	4	5	09	(2.8)
Obesity	2	5	07	(2.0)
Trauma	4	2	06	(1.8)
Autoimmune diseases	2	4	05	(1.5)
Sickle Cell Disease	2	2	04	(1.3)
Connective tissue disorders	1	2	03	(0.8)
Multiple factors	64	76	140	(42.4)

Table 1: Frequency of comorbidities among patients with ischemic cortical stroke in a Kenyan referral hospital.

Outcome	Frequency (%)		
	M	F	
Paralysis	105	95	200 (65.1)
Recovery	20	50	70 (22.8)
Death within 90 days	15	22	37 (12.1)
Multiple factors	140	167	307 (100)

Table 2: Ninety day outcome of stroke patients in a Kenyan referral hospital.

paralyzed. Of these, 105 (52.5%) were female. Seventy (22.8%) had attained clinical recovery. Majority (71.4%) of those who attained clinical recovery were female. Only 12.1% died (Table 2).

Discussion

The current study reveals a hospital prevalence of 3.77 per 1000 higher than 1.1 per 1000 in Ibadan [17] and 3.16 per 1000 from other African states [18]. The anatomical distribution of lesions may influence the outcome, whereas the pattern of comorbidities, age and gender distribution may inform control and prevention strategies.

Anatomical distribution

Parietal and frontal lobes were affected in 78.2% of cases, concordant with prevailing literature reports [19]. This is the territory of supply of the middle cerebral artery (MCA). The regional distribution of acute diffusion and perfusion lesions and final infarcts in acute MCA main stem occlusion relates to the anatomy of arterial supply [20]. Similarity of distribution of infarcts between the Kenyan, Caucasian and Indo-Asian populations suggests a common distribution. Indeed a recent study in the black Kenyan population [21] revealed that the pattern of branching of MCA and therefore its distribution resembles that of Caucasian and Indo-Asian populations. Anatomical localization of infarct influences prognosis, risk of recurrence, clinical assessment and treatment decisions of ischemic stroke [20,22]. This implies that the management of patients should be similar across populations.

Age and gender distribution

Mean age was 54.7 years. This is comparable to 51 years in a black South African population [23] and 55.2 years in Zambia [24]. It is, however, notably almost two decades earlier than the median age of 73 years in European populations [25], mean age of 77 years in the white population of United Kingdom [26] and 10–15 years lower than that reported in most studies from various populations (Table 3) [27-31].

A notable observation is that over 22% of the patients were aged below 40 years, the so called young stroke. This is concordant with the prevailing literature reports that stroke in Sub-Saharan Africa occurs in young people [23]. This implies that a greater number of years of potential working life are lost. It is notable, however, that it is also lower than those reported for other African studies [11,31], suggesting that it is influenced by factors other than ethnicity alone. These differences may be attributed to modifiable risk factors that operate in the respective countries. Indeed, in Kenya, the risk factors are present in young individuals [14].

Author	Population	Mean age (years)
Markus et al., [1]	English	71.5
Ericksson et al., [27]	Swedish	78.4 (F); 73.6 (M)
Nedeltchev et al., [28]	Swiss	63
Sridharan et al., [29]	Indian	67
Bousser et al., [30]	Multicentre Caucasian	67.2
Connor et al., [23]	South African – Black	51
Agyemang et al., [10]	Ghanaian	63.7
Atadzhanov et al., [24]	Zambia	55.2
Eze et al., [31]	Nigerian	61.6
Current Study	Kenyan	54.7

Table 3: Mean ages of stroke in various populations.

Author and year	Hospital and Country	Sample size	Frequency of predominant Risk factors (%)
NakibuuKa et al., [31]	Mulago, Uganda	108	Hypertension (57.6) Physical Inactivity (40.6) Alcohol (18.2) Diabetes mellitus (12.1)
Deresse and Shaweno, [33]	Hawassa, Ethiopia	163	Hypertension (50.9) Cardiac disease (16.6) Alcohol (10.4) Diabetes mellitus (7.4)
Sagui et al., [34]	Dakar, Senegal	107	Hypertension (68) Diabetes mellitus (37.3) Atrial fibrillation (14.7) Smoking (13.3)
Atadzhanov et al., [24]	Lusaka, Zambia	162	Hypertension (64) Alcohol (29.4) HIV (31.7) Smoking (15) Diabetes (12.3)
Sarfo et al., [35]	Kumasi, Ghana	265	Hypertension (85) Physical Inactivity (73) Obesity (58) Hypercholestrolemia (47) Diabetes mellitus (38)
Mapoure et al., [36]	Douala, Cameroon	325	Hypertension (85) Alcohol (28.3) Diabetes mellitus (20.6) Obesity (18) Smoking (16.0)
Watila et al., [37]	Maiduguri, Nigeria	524	Hypertension (8.7) Hypercholestrolemia (15.1) Diabetes mellitus (10.1) Alcohol (8.1) Smoking (6.8)
Urimubenshi, [38]	Ruhengeri, Rwanda	204	Hypertension (60.4) Smoking (14.4) Diabetes (10.1)
Current study, 2015	KNH, Kenya	307	Hypertension (64.1) Smoking (19.2) Alcohol (13.4) Infection (13.6) Diabetes mellitus (3.8)

Table 4: Predominant risk factors from hospital studies in sub Saharan Africa.

Observations of the current study reveal female predominance, at variance with other reports [1,8,31,32]. It is, however, concordant with other recent studies in Kenya [9,12]. The female predominance was observed both in the pre- and the post menopausal age groups suggesting that it is not related to protective effect of estrogen. This female predominance is probably related to the higher prevalence of risk factors for stroke among Kenyan women [14].

Comorbidities

Hypertension, smoking and alcohol were the most common comorbidities concordant with reports from hospital studies on stroke risk factor profile in sub Saharan Africa (Table 4) [33-38].

It is also consistent with the findings of the INTERSTROKE study [39]. The predominance of hypertension as a risk factor is in tandem with the high prevalence of the condition in the Kenyan population [15,16]; and especially among women [14]. This suggests that control of blood pressure constitutes an important preventive measures for stroke [40,41]. Indeed, treatment of blood pressure can reduce the risk of stroke by more than 40% [42].

The high prevalence of smoking and alcohol consumption as risk factors is also consistent with the existence and gender distribution of these vices in the Kenyan population [14].

Another significant risk factor was infection, including HIV. This is concordant with reports that infection is a recognized risk factor for stroke [5,24,43]. In view of the high burden of infection including HIV in Kenya [44], they should always be considered differential diagnoses in cases of stroke.

These findings suggest that non-communicable diseases are overlapping with infectious conditions as reported for Sub-Saharan Africa [45], and control of infections including HIV constitutes an important control measure for stroke. In management of stroke, other risk factors such as autoimmune diseases, sickle cell disease and connective tissue disorders, hitherto unknown, should be considered. The diversity of other risk factors observed in the current study may constitute part of the explanation for the characteristics of stroke demonstrated in the present study namely younger age group, and female predominance. Indeed obesity, autoimmune disorders, and infections including HIV, were found to be more common among women.

Outcome

Twelve point one percent of the patients died. This is lower than 43.2% reported from a Ghanaian Hospital [11] but comparable to 13.6% in Nigeria [17]. These differences be related to the quality of care offered by the hospital.

Conclusion

Ischemic cortical stroke occurs in young individuals in over 20% of the study population and is female predominant. Hypertension, cigarette smoking and infections including HIV are the leading comorbidities, and it causes high morbidity. Control measures comprising regulation of blood pressure, reduction of smoking and prudent management of infections should be instituted from early in life.

Acknowledgement

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