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Original Research

A 2-year review of stroke admissions and short term out-come predictors in a teaching hospital, Southeast, Nigeria.

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Abstract

Background: Stroke is a common neurological disorder with a huge global burden in terms of mortality and morbidity. Epidemiological evidence has shown that modifiable risk factors are responsible for more than 90% of all strokes. Stroke outcome in hospitalized patients is influenced by several variables, such as socio-demographic factors, stroke subtype, and admission severity. The interaction between stroke outcomes and these parameters is often complex. The study is aimed to profile hospitalized stroke patients and determine outcome predictors.

Methodology: A descriptive retrospective study of 100 patients hospitalized for acute stroke. Their medical records were reviewed for demographic and clinical variables and relevant data were retrieved and analysed using appropriate statistical methods.

Results: Of the 100 acute stroke patients studied, 36% were men and 64% were women. The mean age was 65.16±15.72. About 78%had ischemic stroke while 21% had haemorrhagic strokes. The commonest risk factor was hypertension (71.2%). On multivariate analysis, stroke subtype and admission duration were significantly linked to stroke outcome.

Conclusion: Ischemic stroke comprises more than two-thirds of stroke admissions, with hypertension being the most common risk factor and stroke case fatality of 23%. Stroke subtype and admission duration significantly predicted stroke outcomes. The need to step up measures aimed at improving acute stroke care in hospitalized patients is imperative as this will hopefully improve overall outcomes in resource constraint settings such as Nigeria.

Key words: Stroke, Neurology, Risk Factors, Outcome.

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Quick Response Code:

Introduction

Stroke is the second most common cause of death and foremost leading cause of disability globally[1] In-hospital stroke mortality rates for general ward and stroke unit admissions are about 14.7% and 6.9% respectively.[2] Stroke-related mortality and disability-adjusted life years in low- and middle-income countries continue to surge.[3] Age, stroke type, side and site of the lesion, level of consciousness, degree of neurological impairment and disability at baseline, medical risk factors (hypertension, diabetes), premorbid state, fever, blood pressure at baseline, and prior stroke have all been shown to predict outcome, including independence after stroke,[4] while a protracted hospital stay and severe stroke account for the highest mean direct medical cost with the significant economic impact in developing countries[5]

Compared to high-income countries, stroke-related disability and mortality are higher in low- and middle-income countries.[6] Individuals of African descent are more vulnerable to having a stroke than those who are of Caucasian origin.[7] While stroke hospitalization rates vary between 0.9 and 4.0%, stroke admissions make up and make up 0.5 to 45% of neurological admissions and one of the foremost leading causes of death in Nigeria.[8] A plausible reason for these could be the lack of clarity surrounding the correlation between stroke predictor variables and stroke outcome.[9]This slow pace of acute stroke management in low- and middle-income countries makes it challenging to stem the burden of acute stroke in hospitals. The underlying risk factors and cause of the stroke must be known in order to properly manage patients who have experienced an acute stroke.[10]

Acute stroke management in Nigeria is still an unmet need, and the overall implication in terms of outcome prediction, identification of high-risk patients and providing them with optimal care should be the focus of every stroke clinician.

In our cohort of patients, there is need to identify those factors that predict outcome, addressing them hopefully translates to improved care for stroke patients in our environment.

Materials and methods

This retrospective cross-sectional study was conducted at the Federal University Hospital in Owerri, Nigeria, among hospitalized acute stroke patients between October 2017 and October 2019.

Participants in the study were adult patients (18 years of age and older) who had received a clinical diagnosis of either an ischemic stroke or a haemorrhagic stroke with neuroimaging confirmation. The study excluded patients who could not do brain imaging as well those with incomplete medical records. The primary outcome was in-hospital mortality or discharge following a stroke. Age, gender, admission duration, stroke type, dyslipidaemia, alcohol use, and comorbid conditions like hypertension, diabetes mellitus, previous stroke, seizures and atrial fibrillation were evaluated to determine their relationship with the primary outcome.

Sample size

A total of one hundred and sixty-eight (168) adult patients were hospitalized for stroke in the Federal University Hospital Owerri during the study period, one hundred (100) of these individuals were included in this study after meeting the inclusion criteria.

Data collection

Data on sociodemographic factors like age and sex, admission duration, stroke subtype, length of hospital stay, comorbidity status and in-hospital treatment outcomes were retrieved from patients' records as mentioned above and the influence of the variables on stroke outcome was assessed.

Statistical analysis

Data analysis was carried out using SPSS version 21and both descriptive and inferential methods. Continuous variables were presented as mean (±standard deviation (SD)) while categorical variables were represented in frequencies and proportions. The relationship between various sociodemographic and clinical factors was further explored using student t-test and Chi square. A multivariate logistic regression analysis was conducted, after a univariate regression analysis, to identify the independent predictors of stroke mortality. With the corresponding 95% CI, adjusted odds ratios (AOR) were developed. Statistical significance was set at P of 0.05.

Results

We included 100 patients with acute ischemic stroke in this study, as shown in Table 1. The patients were mostly females (64%). The mean age of the study population was 65.16±15.72. The mean age of the male subject was 63.41±15.41 while the mean age of the females subjects66.34±16.72. About 78 (78%) had ischemic stroke and 22 (22%) had haemorrhagic stroke. History of hypertension was present in most of the patients 89 (89%) of the participants and about 29% had a history of DM. Only 2% of the participants in the study were smokers while 6% consumed alcohol. Among the study population, 11% had repeat stroke, 39(3%) had a coexisting atrial fibrillation and 10% of the participants had seizures during the course of their admission. Additional variables observed in this study included bedsores of 2 (2%) of the admitted patients and seizures in 8 (10.1%) and 2 (8.7%) of the discharged and deceased patients, respectively. Although 23 (23%) of the study participants died while receiving medical care, this was not statistically significant. On further analysis of the distribution of study variables by outcome, only stroke subtype, out of all the study variables examined, revealed a statistically significant difference (p=0.003) between the patient groups that survived and those who passed away during the study period.

Table 1: Sociodemographic and clinical characteristics of stroke patients by outcome status

Variable	Discharged n (%)	Dead n (%)	Chi-square	P-Value
Sex				
Male	27 (35.1)	9 (39.1)	0.127	0.806
Female	50 (64.9)	14 (60.1)		
Stroke type				
Ischaemic	66 (85.7)	12 (56.5)	9.097	0.003
Haemorrhagic	11 (14.3)	10 (43.6)		
Hypertension				
Yes	71 (92.7)	18 (78.3)	3.519	0.061
No	6 (7.8)	5 (21.7)		
AFIB				
Yes	3 (3.9)	0 (0)	0.924	0.336
No	74 (96.1)	23 (100)		
DM				
Yes	23 (29.9)	6 (26.1)	0.123	0.726
No	54 (70.1)	17 (73.9)		
Dyslipidaemia				

Yes	2 (2.6)	0 (0)	0.610	0.435
No	75 (97.4)	23 (100)		
TIA				
Yes	0 (0)	1 (4.3)	3.382	0.066
No	77 (100)	22 (95.7)		
Alcohol				
Yes	5 (6.5)	1 (4,3)	0.145	0.704
No	72 (93.5)	22 (95.7)		
Smoking				
Yes	2 (2.6)	0 (0)	0.610	0.435
No	75 (97.4)	23 (100)		
RVD				
Yes	2 (2.6)	1 (4,3)	0.186	0.666
No	75 (97.4)	22 (95.7)		
History of seizures				
Yes	8 (10.4)	2 (8.7)	0.056	0.812
No	69 (89.6)	21 (91.3)		
History of repeat stroke	8 (10.4)	3 (13.0)	0.127	0.721
Yes				
No	69 (89.6)	20 (87.0)		
History of bed sore				
Yes	1 (1.3)	1 (4.3)	0.840	0.359
No	76 (98.7)	22 (95.7)		
History of physiotherapy during admission	55 (71.4)	10 (43.5)	0.081	0.014
Yes				
No	22 (28.6)	13 (56.5)		

A total of 100 stroke patients were admitted during the study period, 77 (77%) were discharged from the hospital while 23 (23%) died during the admission.

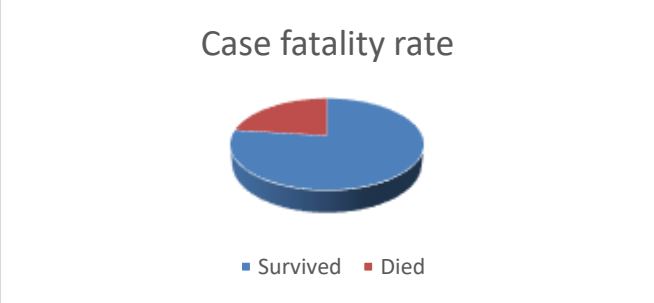

Figure 1: Case fatality rate in the study period

Comparison of clinical and sociodemographic variables between stroke patients that died and those that were discharged.

There was a statistically significant difference in the gender distribution between individuals that died and those that were discharged (male: 27%; vs. female: 50%; p = 0.000). Patients who died while hospitalized had much shorter admission durations at a statistically significant level(days) (8 vs. 14, P = 0.003) when compared to those who survived and were discharged from the hospital.

Table 2: comparison of clinical and sociodemographic variables between stroke patients that died and those that were discharged.

Variables	Died (n=23) Mean ± SD	Discharged (n=77) Mean ± SD	Statistics	p-value
Age	69.13 ± 17.14	63.97 ± 15.18	1.30*	0.203
Gender (Male)	19	27		0.000
SBP	147.35 ± 29.42	154.26 ± 26.61	- 1.01	0.320
DBP	87.91 ± 20.15	89.69 ± 14.38	- 0.39	0.696
MAP	107.71 ± 22.51	111.09 ± 17.36	0.66	0.512
				p-value
Adm. Duration (Median (IQR)	8 (5 - 13)	14 (9 - 18)	505.5**	0.002
			Fisher's exact test: p-value	

On further comparison of the prevalence of the clinical, sociodemographic, and co-morbid characteristics of stroke patients who died while hospitalized versus those who survived and were discharged. The study revealed that males were more likely to die while receiving medical care and the difference was found to be statistically significant (p value= 0.000); other variables (hypertension, diabetes, atrial fibrillation, TIA, repeat stroke, alcohol, smoking, retroviral disease status, seizures, bedsores, patients who underwent physiotherapy, age more than 50 years) examined did not demonstrate a statistically significant difference between the two categories in the study period.

On multivariate logistic regression analysis, only admission duration was noted to significantly predict stroke outcome (AOR = 5.9; 95% CI: 1.87-8.56; P0.003)

Table 3: logistic Regression to determine predictors of outcome.

Variable	Adjusted Odd Ratio (AOR)	p-value	Confidence Interval (CI)
Admission duration	5.9	0.003	1.87-8.56
HTN	0.341	0.153	0.078 – 1.491
Stroke type	5.883	0.003	1.865 – 8.559
History of physiotherapy	0.296	0.026	0.101 - 0.865

Discussion

In this 2-year review of acute ischemic stroke in a tertiary care centre in Eastern Nigeria, t the study showed that more female patients were affected by strokes than male patients and this is similar to the findings from other studies in different settings[11.12]. Although the difference was not statistically significant, the higher frequency of female stroke patients might be attributed to the fact that stroke incidence increases with age and women generally enjoy longer longevity than men. Another perspective to this finding could be related to a better health seeking behaviour by women who and the less likelihood to have a history of dyslipidaemia, diabetes, coronary artery disease, or myocardial infarction or to be current smokers as shown in a study by Eileen et al.[13] There appears to be a rise in the prevalence of stroke among young females.[14] Apart from certain genetic predispositions to stroke in the young females,[15] certain lifestyle factors such as cigarette smoking and use of various substances of abuse may also be contributory.

On the other hand, some other studies found equal frequency of stroke between males and females.[16,17]However, other studies found that the prevalence in male to be higher, this could due to risk factors such as cigarette smoking, and alcohol consumption, which are more common among men when compared to women[18,19]. The mean age of 65.16 ± 15.72 years in this study, was slightly higher than the mean age of 62.9 years reported by Lisk et al. in Sierra Leone[20] but in accordance with other underdeveloped countries stroke studies reporting an average age range of 50–65 years[8,21, 22]. The most common stroke subtype reported in this study was a ischaemic stroke similar to the findings from other local studies.[23]

In terms of stroke risk, this study demonstrated a high prevalence of hypertension occurring in more than half of participants. This was consistent with previous findings in Nigeria and elsewhere.[24,25].Hypertension continues to remain a major driver for stroke as demonstrated in other studies.[26,27] Uncontrolled hypertension is a risk factor for stroke and also a strong predictor stroke outcome.[28] A multicentre study across Ghana and Nigeria by Sarfo et al among stroke patients noted that each 10 mm Hg in systolic blood pressure increased was linked to a 2% (1–4%) increased risk of inpatient death, indicating that higher systolic blood pressure at presentation increased fatality.[29] While blood pressure elevation following a stroke may be necessary to sustain cerebral perfusion pressure, excessive blood pressure spikes are harmful and stimulate expansion of cerebral oedema.[30] Indeed, a meta-analysis of several studies has found a continuous and graded relationship between blood pressure and stroke risk in many populations, with higher levels of blood pressure conferring greater risks of stroke in hypertensive and normotensive subjects. DM was discovered in 29% of stroke patients, which is in close proximity to the findings of other hospital-based studies in Africa, where the prevalence of DM was 26% and 33.7%, respectively, in Ethiopia and Kenya.[19, 20] This alludes to the synergistic impact

of DM and hypertension on stroke and shows that the importance of diagnosing and treating hypertension and diabetes for the prevention of stroke cannot be overemphasized

In this study, 3% of the patients who underwent electrocardiography (ECG) had atrial fibrillation, the frequency of atrial fibrillation was quite low in our cohort. This could be related to our diagnostic evaluation for atrial fibrillation as most of our patients were tested using a single resting ECG, which is limited by its inability to detect paroxysmal episodes of atrial fibrillation. It is markedly lower than what was found in the Copenhagen Stroke Study, which found that atrial fibrillation affected 18% of stroke patients .These findings were not found to have an impact on the survival of stroke patients who were admitted.[31, 32,33]However, the fact that the focus of our study was only short-term outcome may have not accounted for this

Between 2004 and 2021, hospital-based studies in Nigeria revealed 30-day case fatality rates ranging from 21.2% to 40%.[34,35,36]In our study the in-hospital case fatality rate was 23%, which was within the range of other hospital based studies in Nigeria ; however, lower figures have even emerged from other similar studies from Addis Abeba and Southern parts of Ethiopia, which reported rates ranging from 12 to 21% [37,38] However, this was lower than the 30% 30 day case fatality rate published in a systematic evaluation of hospital-based prospective studies in Sub-Saharan Africa[39, 33] but was higher than data from some other hospital based study in India.[40] These discrepancies could be due to variations in the diagnostic methods, treatment modalities, and stroke care provided in these centres. In contrast to studies[41.42]from other regions where haemorrhagic stroke is primarily responsible for in-hospital mortality, the ischaemic stroke and haemorrhagic stroke case fatality rates were 56% and 43.6%, respectively, among the 22 patients who passed away during the study period. The case fatality reported in these investigations may also have been influenced by other comorbid factors particularly, hypertension, atrial fibrillation, structural heart diseases, diabetes mellitus, obesity, dyslipidaemia and kidney disease as elaborated in these studies.

Similar to some studies[43, 44] stroke subtype, gender (male), admission duration, .have a significant relationship with in-hospital death (p-values of 0.003 (CI=1.865-8.559), <0.001, 0.002 and respectively). In addition to focusing Interventions to reduce stroke mortality in the acute phase, studies have shown that addressing other parameters such as admission duration as shown in this study, would help to reduce the morbidity and mortality associated with stroke outcome. [45,46] While increase risk of in-hospital death rate was not linked to patients who have atrial fibrillation or dyslipidaemia among the listed risk variables. This result is contrary with research from the Copenhagen Stroke Centre and the European Community Stroke Project[47]. Similar to what was seen in an earlier study, a previous history of stroke and transient ischemic attack was linked to a higher rate of in-hospital death respectively[47] though not at a statistically significant level.

Conclusion

This study has provided a peep into the in-hospital mortality of admitted stroke patients in the Eastern region of the country. revealed that indices such as male gender, length of hospitalization, and stroke subtype were related to in- hospital stroke mortality. To lower the rates of in-hospital fatality in stroke patients, additional attention should be given to these predictors of in-hospital stroke outcome especially reducing hospitalization time.

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