Original Article

PREVALENCE OF CEREBROVASCULAR ACCIDENT AND ITS ASSOCIATED RISK FACTORS AMONG PATIENTS ADMITTED INTO THE NEUROLOGICAL WARD OF UNIVERSITY OF BENIN TEACHING HOSPITAL

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Abstract

Background: Stroke is the second leading cause of death, accounting for 11.13 % of total deaths, and the main cause of disability worldwide.

Objective: To determine the prevalence of stroke, its associated risk factors and survival rate among patients admitted to the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State.

Methods: A retrospective descriptive survey of patients admitted to the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State from 2015 to 2020. A proforma was used to collect relevant data from medical records. Data was analyzed with IBM SPSS Statistics version 23, using descriptive and inferential statistics at 5% level of significance.

Result: The average prevalence of cerebrovascular accident over the six years under review was 58.9%. Highest (69.3%) prevalence was recorded in 2018. Males (52.9%) were more affected than females and the age range 70-89 years was most affected (47.6%). The commonest comorbidities were hypertension and diabetes mellitus. Survival rate was high during the period under review, it was at the least in 2016 at 67.1% and highest in 2019 at 76%. Multiple logistic regression shows that patients who had CVA at below 30 years old were less likely to survive (OR;0.06: CI: 0.000-0.114; p = 0.001). Being married conferred a greater likelihood of surviving a CVA (OR;5.34: CI: 1.135 -25.135; p = 0.034) than being unmarried (OR;2.89: CI: 2.702-49.673; p = 0.004). Tertiary level of education conferred the greatest likelihood of surviving a CVA (OR;8.00: CI: 24.401-1168.674; p = 0.000).

Conclusion: The prevalence of stroke from this study was high. Hypertension and diabetes mellitus were the most common risk factors associated with stroke. In-hospital stroke survival rate was high. The findings from this study can support advocacy for more efficient community-based programs geared towards awareness creation about stroke, its risk factors and prevention.

Keywords: Cerebrovascular Accident, Prevalence, Risk Factors, Survival rate.

INTRODUCTION

Cerebrovascular accident (CVA), a medical term for stroke occurs when an artery to the brain becomes blocked or ruptures, resulting in death of an area of brain tissue due to loss of its blood supply (cerebral infarction).[1] Stroke is the second leading cause of death, accounting for 11.13 % of total deaths, and the main cause of disability worldwide.[2] The major type of stroke is ischemic, which occurs in about 87% of all stroke cases.[3]

Stroke is a condition that affects almost every aspect of the survivor's life.[4] Stroke is among the leading causes of diminished quality of life globally because of the adverse consequences on the physical, psychological, emotional, social, and economic status of stroke survivors.[4] It also leads as a cause of morbidity and mortality worldwide and according to the World Health Organization projections, it is likely to worsen in developing countries over the next two decades.[5]

With the battle against HIV/AIDS and other communicable diseases like multi-drug resistant malaria and tuberculosis still ongoing, Nigeria risks a further strain on its resources as a result of the increasing prevalence of stroke and other cardiovascular diseases.[6] Stroke patients suffer from post stroke depression, a complication which occurs in 30% of cases and is associated with increase in morbidity and reduced survival.[7] Apart from the burden of stroke on the survivors, caregivers of people with stroke experience mental disorders and burden negatively affecting their quality of life,[8] making them also prone to emotional distress and a reduced quality of life. Beyond the burden of stroke from associated high mortality, the high morbidity accounts for chronic disability in up to 50% of survivors, thus, stroke is a disease of huge public health importance with serious economic and social consequences.[9] Risk factors for stroke over some years have been identified from epidemiological studies and are classified into non-modifiable and modifiable risk factors.[10] The non-modifiable risk factors are black race, family history, male gender and older age. Hypertension is the commonest modifiable risk factor while other common risk factors are central obesity, dyslipidemias, diabetes mellitus, heavy alcohol consumption, cigarette smoking, vasculitis and cardiac disorders.[10] Other well recognized risk factors are hypercoagulable states, vasculitic lesions, oral contraceptives and Sickle cell disease. HIV and hyperhomocysteinaemia were more recently noted as novel risk factors for stroke. Hypertension is the commonest risk factor in Nigeria. Other apparent risk factors in Nigeria are central obesity, Diabetes mellitus, previous stroke, HIV and cardiac disease.[10]

The current prevalence of stroke in Nigeria is 1.14 per 1000 while the 30-day case fatality rate is as high as 40%.[6] It has been documented that 90% of incidence of stroke is due to modifiable risk factors while recurrent stroke is 80% preventable through optimal risk factor modification.[11] Rigorous stroke epidemiology is necessary for understanding of the mechanisms of stroke, efficient planning and delivery of stroke management services, effective application of stroke prevention strategies and development of new strategies. It will also help to create awareness of the risk factors associated with stroke in the community and sensitize the community on the cultural and behavioral practices contributing to risk of stroke. Though several studies have assessed the knowledge of stroke and its risk factors in Nigeria, but there is dearth of empirical retrospectives studies on the prevalence of stroke and its associated risk factors in Edo state particularly in Benin City. Hence this study was conducted to determine the prevalence of stroke, its associated risk factors and survival rate among patients admitted at the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State.

OBJECTIVES OF THE STUDY

1. To determine the prevalence of CVA among patients admitted to the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State from 2015 to 2020.
2. To identify the risk factors that were present in the patients admitted for CVA during the period under review.
3. To determine CVA survival rate among the patients admitted during the period under review.

MATERIAL AND METHODS

Study Design and Setting: This study was a retrospective, descriptive survey carried out from January, 2015 to December, 2020 in the University of Benin Teaching Hospital, Benin City, Edo State. University of Benin Teaching Hospital, Benin City, Edo State is the sixth of the first-generation teaching hospitals in Nigeria and first in Edo state.

Study Population: Patients admitted to the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State from 2015 to 2020

Instrument for Data Collection: An observational checklist (PROFORMA) developed by the researchers based on the objectives of the study, for manual collection of primary data of patients, was used to collect data from case notes and hospital records of patients admitted during the year under review. The checklist was divided into two sections for demographic data and other data in line with the objectives of this study.

Validity: The instrument was subjected to face and content validity by data experts. Remarks, feedback, comments and observations from the experts were

utilized to make corrections on the checklist, to ensure data is collected in line with the objectives of the study.

Method of Data Collection: Data was collected with the help of two trained research assistants who were medical record officers. Hospital record books and patients' case notes at the medical records, of all patients who were admitted to the Neurological ward of University of Benin Teaching Hospital from January, 2015 to December, 2020 was manually screened. Using the proforma, data of patients with CVA including their socio-demographic characteristics; risk factors present in them; and documented outcome were extracted.

Data Analysis: The data was analyzed using descriptive and inferential statistics at 5% level of significance. Chi square and multivariate logistic regression were used to determine association between variables. All analysis was done using IBM SPSS Statistics version 23.

RESULTS
During the period under review, 2,373 patients were admitted into the neurological ward of the hospital. The majority of the patients were admitted in year 2015 and the least number of admissions was in the year 2018 (Table 1). Of these, 1, 397 had CVA giving an average prevalence of 58.9% over the six years under review. The highest prevalence (69.3%) of CVA was recorded in 2018, while the lowest prevalence (50.6%) was recorded in 2015 (Figure 1).

Table 1: Number of admitted patients by year

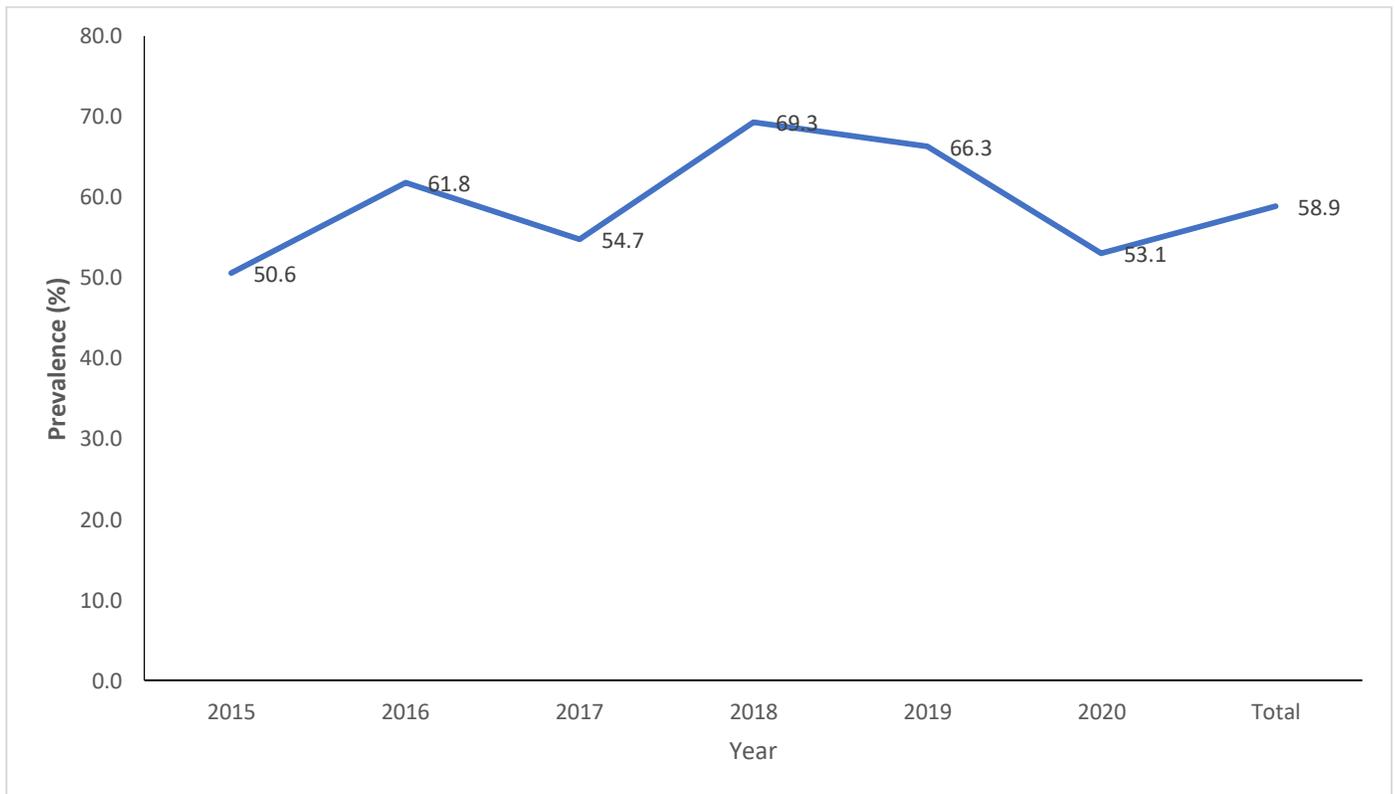| Year	Number of patients
2015	451
2016	403
2017	349
2018	329
2019	415
2020	426
Total	**2373**

Figure 1: Prevalence of CVA among patients admitted to the neurological ward of UBTH from 2015 to 2020

There were more males diagnosed with CVA during the period under review, n = 739; 52.9%. Majority were in the age range 70 – 89 years. Table 2 further shows the demographic distribution of the patients diagnosed with CVA.

Table 2: Demographic characteristics of patients with stroke

Variable	Frequency N = 1,397	Percentage (%)
Sex		
Male	739	52.9
Female	658	47.1
Age group (Years)		
<30	22	1.6
30 – 49	241	17.3
50 – 69	259	18.5
70 – 89	665	47.6
90 and above	210	15.0
Marital Status		
Married	1,389	99.4
Single	8	0.6
Educational status		
Primary school	245	17.5
Secondary school	260	18.6
Tertiary	883	63.2
Religion		
Christian	640	45.8
Muslim	125	8.9
Others	632	45.2
Ethnicity		
Bini	767	54.9
Esan	345	24.7
Esanko	200	14.31
Others	85	6.0

Risk factors of CVA among stroke patients

The highest recorded risk factor for CVA was hypertension; 606 (43.4%) followed by Diabetes mellitus; 517 (37.0%). Others are previous history of CVA; 61 (4.4%), physical inactivity; 12 (0.9%), family history; 65 (4.7%), overweight; 25 (1.8%), alcohol; 28 (2.0%), seizure; 19 (1.4%), smoking; 25 (1.8%), chronic kidney disease; 25 (1.8%), trauma; 16 (1.1%), high cholesterol; 14 (1.0%) and cerebral palsy; 7 (0.5%). Year on year between 2015 and 2020, hypertension remained the highest recorded risk factor for CVA except in 2019 when there were more CVA patients with Diabetes mellitus (Figure 2).
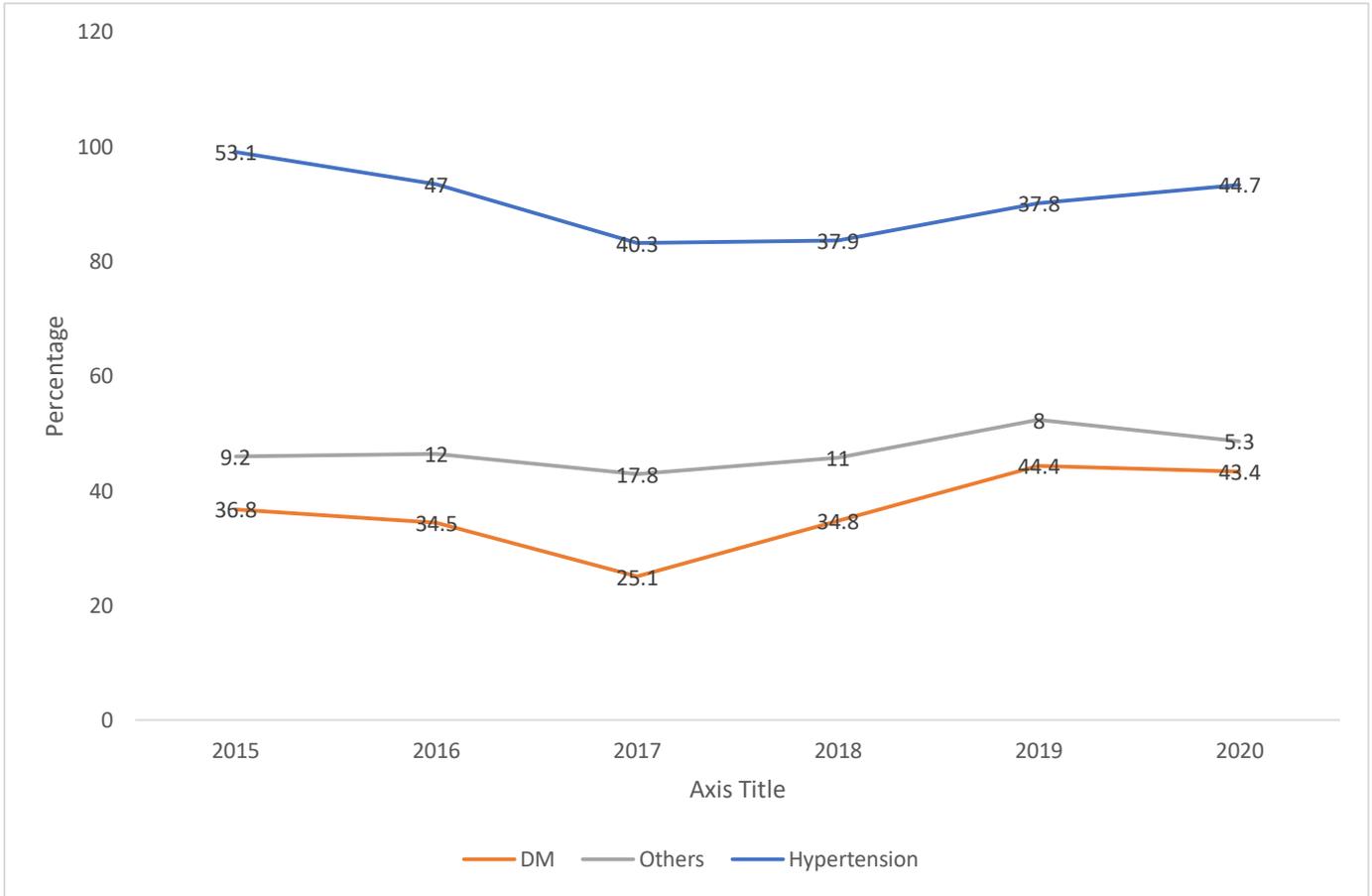
Figure 2: Year on year recorded risk factors for CVA

CVA survival rate

Annual CVA survival rate from 2015 to 2020 is shown in Figure 3. Year 2019 recorded the highest rate of survival at 76%, and year 2016 recorded the lowest rate of survival at 67.1%. There was a significant relationship between outcomes of CVA and the risk factors recorded in the patients (Table 3).
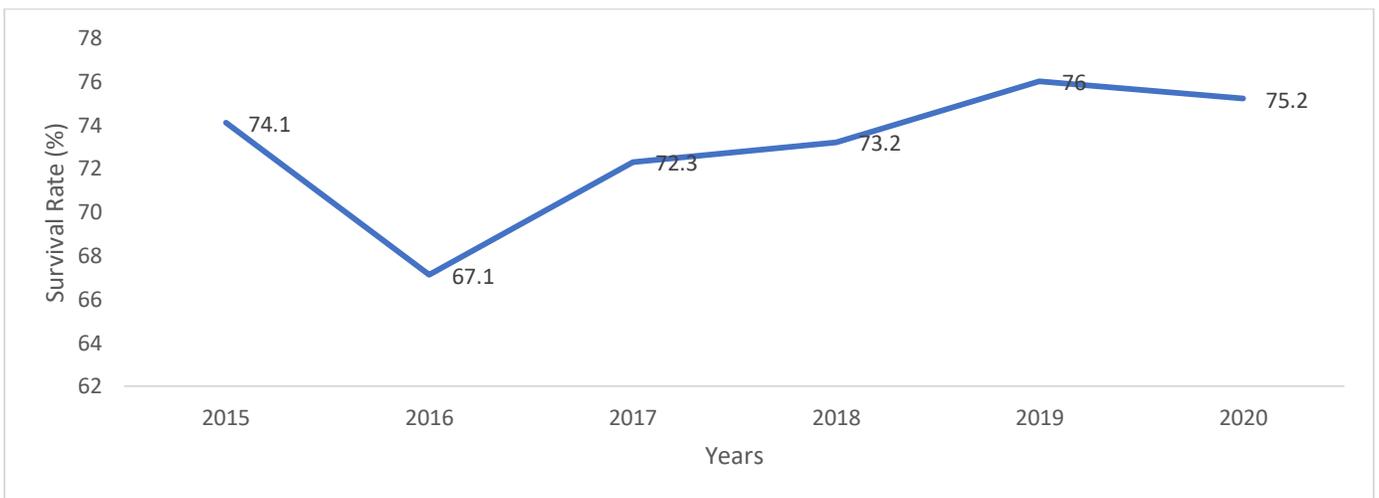

Figure 3: Annual Survival rate of CVA

Table 3: Relationship between CVA outcomes and risk factors for CVA

Outcome of CVA	Risk factors for CVA				
	Hypertension	DM	Others	χ^2	P
Dead	377(27.0)	22(26.5)	144(10.3)	37.228	0.006
Survive					
• **DAMA**	50(3.6)	6(7.4)	65(4.7)		
• **Discharged by physician**	970(69.4)	3(2.0)	61(4.4)		

DAMA (discharge against medical advice)

Table 4 shows a multiple logistic regression analysis to determine the probability of CVA survival with each of the socio-demographic characteristics of the patients. Only age below 30 years, marital status and level of education had statistically significant associations (p<0.05) with CVA survival. Patients who had CVA at below 30 years old were less likely to survive (OR;0.06: CI: 0.000-0.114; p = 0.001). Being married conferred a greater likelihood of surviving a CVA (OR;5.34: CI: 1.135 -25.135; p = 0.034) than being unmarried (OR;2.89: CI: 2.702-49.673; p = 0.004). Tertiary level of education conferred the greatest likelihood of surviving a CVA (OR;8.00: CI: 24.401-1168.674; p = 0.000).

Table 4: Multiple logistic regression to determine probability of CVA survival with each social demographical characteristic.

	P	OR	95% Cl for OR
Sex			
Male		1.00	
Female	0.749	1.86	0.343-2.159
Age			
<30	0.001	0.06	0.000-0.114
30-49	0.476	0.553	0.108-2.822
50-69	0.191	0.423	0.117-1.535
70-89	0.237	2.466	0.132-1.651
>90		1.00	
Marital status			
Single	0.004	2.89	2.702-49.673
Married	0.034	5.34	1.135 -25.135
Level of education			
Primary	0.000	1.03	2.664-49.673
Secondary	0.000	4.94	3.330-46.882
Tertiary	0.000	8.00	24.401-1168.674
Occupation			
Farming	0.854	1.31	0.304-4.209
Trading	0.376	7.89	0.494-6.484
Others		1.00	
Tribe			
Bini	0.326	0.31	0.031-3.177

Esan	0.851	7.96	0.074-8.599
Esanko		3.92	12.392-12.392
Others		1.00	0(0.0)

OR: Odds ratio. CI: Confidence interval.

DISCUSSION

The persistence of cerebrovascular accident and its associated risk factors has been demonstrated in various studies in the past. Findings from this study showed an average prevalence of 58.9% over the six years under review and from the trend shown by the results of this study, the prevalence of CVA is not reducing. This value is in contrast with the reported prevalence of 3.1% in Edo State.[12] This contrast may be due to the fact that the Edo State study was carried out in a Secondary Hospital where many cases of CVA would not have been admitted but referred to a tertiary facility for expert management. Also, in Gorgan a prevalence of CVA of 1.79% was reported[2] and 3.1% in southwestern China.[13] The reason for this difference may be due to geographical location occasioned by race, as stroke is reportedly more common among black compared to Caucasian or other races.

The highest number of cases of CVA recorded among patients in the age range 70-90 years from this study supports that reported in Gorgan where CVA was more common in the age group 70 years and above.[2] Also, findings from this study shows that CVA is more preponderant among males than females. This finding supports the finding reported in Benin City, Edo State,[12] another study in South west Nigeria,[14] and in Ethiopia.[15] The results of this present study also corroborate the findings of a systematic review on stroke in Nigeria, where it was reported that stroke is the leading cause of adult neurological admissions and medical coma, which accounted for up to 57-78% of adult neurological admissions with age cohort of $\geq$ 60 years and a higher proprodence among males in Nigeria, Sudan and Tanzania.[16] A male preponderance in stroke presentation in African hospitals was also observed in this review.[16]

Hypertension, diabetes mellitus, family history, previous history of CVA, alcohol consumption, hyperlipidemia, overweight, smoking, seizure, chronic kidney disease, cerebral palsy, physical inactivity were the risk factors identified in patients with CVA in this study. The commonest comorbidity in CVA patients reported in this study was hypertension with a prevalence of 43.4%, followed by diabetes mellitus with a prevalence of 37.0%. This finding agrees with findings reported in Ethiopia where similar risk factors were identified and the magnitude of hypertension, diabetes mellitus, and atrial fibrillation among stroke patients were 47%, 8%, and 10% respectively.[17,18] Other studies supporting the findings of this study are Mulugeta et al, in Northwest Ethiopia; Odiase and Iyasere, in Edo state; Yi et al, in China and Oni et al in south west Nigeria.[12-14,19] Hypertension increases peripheral vascular resistance. Hypertensive disorders promote stroke by increased shear stress, endothelial dysfunction, and stiffness of large arteries that transmits pulsatile flow to the cerebral microcirculation. Hypertension also promotes cerebral small vessel disease by several mechanisms including hypoperfusion, diminished auto-regulatory capacity and localized increase in blood-brain barrier permeability.[20] On the other hand, hyperglycaemia in diabetes mellitus also accelerates atherosclerosis. These changes predispose to thrombus formation and ischaemic stroke. Hence, adequate management and control of hypertension and diabetes mellitus is pivotal to prevention of CVA.

Findings from this study showed that CVA survival rate was high during the period under review, it was at the least in 2016 at 67.1% and highest in 2019 at 76%. Possible reason for this survival rate among stroke patients can be attributed to facilities for prompt diagnosis and the quality of care they received; the study setting being one of the first-generation tertiary institutions in South-South that parades an array of high caliber neurologist and nurses specialized in care of neurological cases. This finding is in line with that in Burkina Faso, where survival rates of 69% and 61.9% in a 7-day and 14-day study respectively were reported.[21] From the Burkina Faso study, mortality was higher in males at 60.1% and the predictors of mortality were history of heart disease, post stroke pneumonia, and urinary tract infections.[21] An Ethiopian study reported a higher survival rate,[18] which suggests a possibly better health care system.

On the other hand, the high survival rate from this study is in contrast with the finding in Jos where the mortality rate was 76.2%; by implication a lower survival rate, with predictors of mortality being age ≥ 60 years, male gender, loss of consciousness, high National Institute of Health Stroke Scale score (≥ 16), the presence of co-morbid conditions and presence of complications.[10] Similarly, a higher mortality rate of 68.8% was reported in a secondary health facility in Benin City.[12]

CONCLUSION

The prevalence of stroke among patients admitted to the neurological ward of University of Benin Teaching Hospital, Benin City, Edo State was high. Hypertension and diabetes mellitus were the most common risk factors associated with stroke in this study. Furthermore, the in-hospital stroke survival rate was high. The findings from this study can support advocacy for more efficient community-based programs geared towards awareness creation about stroke, its risk factors and prevention.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS
Timothy A Ehwarieme conceived and designed the study, analysed the data and prepared the first draft of manuscript. Anwuli Emina collected data and edited the draft of the manuscript. Both authors read and approved the final manuscript.

ETHICAL APPROVAL
Ethical clearance was obtained from the ethical and research committee of the University of Benin Teaching Hospital.

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