CLINICAL STUDIES / ETUDES CLINIQUES

THIRTY-DAY STROKE MORTALITY AND ASSOCIATED CLINICAL AND LABORATORY FACTORS AMONG ADULT STROKE PATIENTS ADMITTED AT MULAGO HOSPITAL (UGANDA)

MORTALITÉ À TRENTE JOURS CORRELÉE AUX ASPECTS CLINIQUES ET BIOLOGIQUES CHEZ DES PATIENTS ADULTES ADMIS POUR UN ACCIDENT VASCULAIRE CÉRÉBRAL À L'HÔPITAL DE MULAGO (OUGANDA)

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ABSTRACT

Background

Although stroke mortality in developing countries is more than 85%, the case fatality in Uganda is not known.

Objective

We determined 30 day case fatality, associated clinical and laboratory presentations among adult stroke patients admitted to Mulago Hospital.

Design

Prospective descriptive study

Setting

Mulago national referral hospital, Kampala, Uganda

Participants

Stroke patients presenting from July 2010 to January 2011.

Intervention

Patients presenting to the accident and emergency with stroke confirmed on brain computerised tomography (CT) scan were recruited consecutively and subsequently transferred to the neurology unit. Selected social demographics, clinical and laboratory presentations were obtained. Supportive care, specific treatment and rehabilitation services were offered to the participants.

Main Outcome Measures

Case fatality rate at 30 days

Results

Out of 150 eligible participants, 17 declined, 133 were enrolled into the study but 5 were lost to follow up. Data from 128 participants were analysed. The mean age was 62.3+15.7 years and 58.0% were females. Ischemic and haemorrhagic stroke contributed 79% and 21% respectively. Majority of participants 97 (76%) had only motor deficits and 78 (61%) had impaired consciousness. More than half of participants had high blood pressure at admission, with diastolic and systolic hypertension among 106 (83%) and 68 (53%)

respectively. Forty eight (38%) participants had hyperglycemia, 42 (33%) leucocytosis, 13% elevated low density lipoprotein and 9% high triglycerides. No participant with ischemic stroke presented in time for thrombolysis. The 30 day case fatality was 43.8% and factors independently associated with it were Glasgow coma scale (GCS) < 9 p = 0.001and age 51-60 years P=0.044.

Conclusion

Thirty-day case fatality was high. Poor prognostic factors were GCS of <9 and age 51-60 years. Early presentation to hospital, intensive management, implementation of treatment guidelines and measures to prevent stroke should be emphasised.

INTRODUCTION

Stroke is becoming a serious problem in public health in developing countries, Uganda inclusive, accounting for 85% of global deaths (2, 5, 7, 8, 13, 26, 27, 28, 29). Stroke severity, its associated complications, and lack of stroke units contribute to the high mortality rate found to be as high as 62% at one year (9, 14, 20, 21, 22, 30, 31). Despite this, there is very limited data on stroke mortality in sub-Saharan Africa, and to the best of our knowledge there are no published data on stroke mortality in Uganda. In this study, we reported the 30 day stroke mortality and associated clinical and laboratory presentations among adult patients admitted with stroke at Mulago hospital in Uganda.

METHODS

Setting: Mulago Hospital is Uganda's national referral hospital and Makerere University College of Health Sciences' teaching hospital. It is located in Kampala and has an estimated bed capacity of 1,500. It has an accident and emergency unit, intensive care unit, clinical laboratory, radiology department with a CT scan and highly trained radiologists, neurology, neurosurgery and physiotherapy units.

Study period: During a six months period from 1st July 2010 to 30th January 2011, 167 patients who presented to Mulago hospital's accident and emergency unit with neurologic deficits suggestive of acute stroke (29) were screened. Computerised tomography scan of the brain was done to confirm stroke by radiologists with experience in this field. Classification of stroke subtypes was done using the Trial of ORG 10172 and medical disability guidelines for ischemic and hemorrhagic stroke respectively (1, 17). Patients who had a normal brain CT scan, had a repeat done on day 7 and were excluded in case it was still normal. Participants with confirmed stroke were approached for enrolment into the study. Those that consented were recruited consecutively. An interviewer based questionnaire was administered by the principal investigator and trained research assistants. Selected social demographic characteristics, medical history relevant to stroke and a comprehensive clinical examination was done. Blood samples for essential laboratory investigations (complete blood count, erythrocyte sedimentation rate, fasting lipid profile and blood sugar, HIV serology and rapid plasma reagin) were obtained. These patients were reviewed every two days from the day of admission while on the ward until discharge. Upon admission, the patients were managed on the accident and emergency unit, and general neurology unit by a neurologist, internal medicine physicians, nurses and auxiliary staffs. They received supportive treatment which included ensuring a patent airway, good oxygen saturation, haemodynamic stability, nutrition, hydration, temperature and glycaemic control, prevention of deep vein thrombosis and pressure sores. Specific treatment included use of antihypertensive drugs (labetalol and hydralazine) when blood pressure exceeded 180/105mmHg and 160/100mmHg for ischemic and haemorrhagic stroke respectively. Antiplatelet drugs including aspirin and clopidogrel for ischemic stroke and statins were administered. Rehabilitation included physiotherapy, occupational, speech and language therapy. Those that required mechanical ventilation were admitted to the intensive care unit. None of the patients with ischemic stroke benefitted from recombinant tissue plasminogen activator because they presented on average 2 days post ictal. On discharge, they were then scheduled for a neurology outpatient clinic visit that coincided with the 30th day from the date of stroke onset. Participants that did not turn up for the scheduled visit were then contacted by telephone (contacts of three immediate relatives) to ascertain whether they were still alive or dead. Participants who died within 30 days of stroke onset were recorded.

RESULTS

One hundred and sixty seven patients who presented to Mulago hospital's accident and emergency unit with neurologic deficits suggestive of acute stroke (29) were screened. One hundred and fifty patients, 18 years and above, were confirmed to have stroke on brain CT scan. Seventeen patients declined to consent for participation in the study and 133 patients were enrolled consecutively into the study. Five participants were lost to follow up and therefore data from 128 participants were analysed. At the end of the follow up period of 30 days from stroke onset, 56 (43.8%) participants had died while 72 (56.2%) were still alive. Stroke mortality was not stratified at 24 hours and seven days from stroke onset as this preliminary study only established stroke mortality at 30 days among adult stroke patients admitted at Mulago hospital.

The mean age of the participants was 62.3+15.7 years with a median of 64.5 and 58% were female. Fifty six percent of the participants had never had formal education, 38% were Catholic and 66% were married.

Twenty one (15.8%) were taking alcohol while only 3 (2.3%) were current smokers. Social demographic characteristics are presented in Table 1.

Majority of the participants 105 (79%) had ischemic stroke and 28 (21%) had hemorrhagic stroke. All study participants presented with focal neurological deficits, with majority 97 (76%) presenting with only motor deficits. Impaired level of consciousness was present in 78 (61%) patients. More than 50% of the participants had high blood pressure at admission with diastolic and systolic hypertension found among 106(83%) and 68 (53%) respectively. Eighty four (66%) were aware of their hypertension. The clinical characteristics of the study participants are presented in Table 2.

Most patients 103(80.47%) had haemoglobin levels less than 11.5g/dl followed by hyperglycaemia of more than 7.0 mmol/l in 48 (38%) and leucocytosis in 42 (33%) patients. The laboratory presentations of the study participants are presented in Table 3.

Clinical and laboratory parameters that were significantly associated with mortality at bivariate analysis with P- value set at < 0.05 were entered into the multivariate linear logistic regression model. Factors that were significantly associated with 30 day stroke mortality were; age 51-60 years with OR 0.18 (95% CI; 0.04- 0.82) p value 0.044 and Glasgow coma scale < 9 OR 0.13 (95%CI; 0.05-0.25) p value <0.001. Temperature, though not statistically significant at multivariate analysis, it was associated with increased mortality at bivariate analysis OR 2.81 (95%CI; 1.2-6.60) P<0.005. On the other hand, though mortality was higher among patients with hemorrhagic stroke (54%) compared to ischemic stroke (41%), there was no statistically significant difference at bivariate analysis OR 1.71 (95% CI 0.68-4.27). Factors significantly associated with 30 day stroke mortality are presented in Table 4.

DISCUSSION

Stroke has been demonstrated in this study as a challenge among patients admitted to Mulago hospital. The majority of patients in this study were female 74 (58%). They were also relatively young with mean age of 62.3years similar to other studies in sub-Saharan Africa (21) unlike in the West where the mean age is above 75years (30).

The 30-day mortality among stroke patients was 43.8% which is similar to other hospital based stroke case fatality studies in Africa: 54% in Gambia, 33.6% in Nigeria and 49.6% in Maputo Mozambique (6, 10, 20, 21, 22, 25).

However in developed countries where patients present early following stroke and care takes place in specialized stroke units, the 30-day stroke mortality is much lower. A study done in Toronto, Canada showed 30 day mortality among stroke patients of 20% (30).

Majority of the patients presented with history of loss of consciousness 78 (61 %), Glasgow coma scale less than 9, 38(30 %) and diastolic hypertension 106 (83%) which is comparable with other studies done in resource limited countries (3). A Glasgow coma scale score of less than 9 was associated with increased mortality which is also comparable with other studies done on stroke mortality (23, 30).

Regarding stroke subtypes, majority of the patients had ischemic stroke (79%), mortality was higher among those with hemorrhagic stroke, however there was no statistically significant difference in mortality between hemorrhagic and ischemic stroke. This is in contrast to other studies, which demonstrated a higher mortality among patients with hemorrhagic stroke (20, 23). In this study, probably we needed a bigger sample size to conclusively come up with a more realistic association.

In this study, patients who were between the ages of 51 and 60 years (6th decade) had a higher 30 day stroke mortality rate compared to those who were below 51 and above 60 years. However, those above 70 years of age had the highest 30 day mortality rate which is similar to other studies that showed mortality worsens with advancing age (30). Smoking and alcohol use were not associated with increased 30 day stroke mortality among the study participants which is similar to other studies (4). Studies on 30 day stroke mortality and associated factors demonstrated a trend that hyperpyrexia worsens stroke mortality (11, 12). This trend was not sustained at multivariate analysis.

Prevalence of HIV among stroke patients was 12%, which is higher compared to 5.8% in an earlier study done in Mulago among stroke patients in 2007 (19). In the general population the average HIV seroprevalence in Uganda is 7.3% as reported by Ministry of Health, Uganda (24). At Mulago hospital, HIV seroprevalence on the medical wards currently stands at 50 % (16). The HIV seroprevalence among our study participants was much lower than reported from studies done in Muhimbili, Tanzania and Blantyre, Malawi 20.9% and 48% respectively (15, 18). In these two studies, the average mean age of the patients was 47years, which is lower than the mean age in our study which was 63.3 years.

CONCLUSION

Thirty day mortality among adult stroke patients admitted at Mulago hospital was 43.8%. Delay in hospital presentation and lack of organised inpatient stroke care (stroke units) is likely responsible for this high mortality. Poor prognostic factors for 30 day stroke mortality in our study population were GCS of <9 and age 51-60 years. Future studies should be directed towards increasing stroke prevention and public recognition of stroke to enhance early presentation to hospital as well as setting up organised inpatient stroke care facilities to decrease morbidity and mortality from stroke.

Conflit d'intérêt : Aucun

Table 1: Social demographic characteristics of the study participants

Characteristics	Frequency N=128	Percentage
Age		
<51	32	25
51-60	24	19
61-70	35	27
>71	37	29
Gender		
Male	54	42
Female	74	58
Level of education		
None	71	56
Primary	17	13
Secondary	21	16
Tertiary	19	15
Religion		
Catholic	48	38
Protestant	41	32
Moslem	28	22
Others	11	09
Marital status		
Single	07	06
Married	84	66
Divorced	06	05
Widowed	31	24
Life style		
Smoker	3	02
Alcohol consumption	21	16

Table 2: Clinical presentation of the study participants

Variable	Frequency N = 128	Percentage
Symptom		
Sudden trouble in walking	108	84
Sudden weakness of the face	109	85
Sudden numbness of the face	80	63
Sudden onset of vomiting	37	29
Loss of consciousness	78	61
Past medical history		
Diabetes	26	20
Heart disease	14	11
Antihypertensive drugs	84	66
Antiplatelet drugs	23	18
Anticoagulants	3	2
Physical examination		
Glasgow coma scale <9	38	30
Glasgow coma scale >9	90	70
Motor	97	76
Sensory	2	6
Motor & sensory	29	22
Blood pressure		
Systolic >140mmHg	68	53
Systolic <140mmHg	60	47
Diastolic >90mmHg	106	83
Diastolic <90mmHg	22	17
Irregular pulse	17	13
Stroke subtype		
Ischemic	105	79
Hemorrhagic	28	21

Table 3: Laboratory presentation of study participants

Variable	Frequency N=128	Percentage
Complete blood cell count		
WBC count		
>11,000	42	33
<11,000	86	67
Platelet count		
>450	9	7
<450	199	93
Haemoglobin (g/dl)		
>11.5	25	20
<11.5	103	80
HIV serology		
Reactive	15	12
Non-reactive	113	88
Blood sugar		
>7mmol/L	48	38
<7mmol/L	80	62
Fasting lipid profile		
LDL		

Variable	Frequency N=128	Percentage
High	17	13
Normal	111	87
HDL		
Low	50	39
Normal	78	61
Triglycerides		
High	11	9
Normal	117	91
Total cholesterol		
High	46	36
Normal	82	64
TPPA		
Positive	15	12
Negative	113	88

Table 4: Clinical and laboratory findings significantly associated with 30 day stroke mortality at multivariate analysis

Variable	Alive n=72 (%)	Dead n=56 (%)	AOR	95%CI	P value
Gender					
Male	34(63.0)	20(37.0)	1		
Female	38(51.0)	36(49.0)	1.7	0.67-4.27	0.261
Age group (years)					
<51	19(59.0)	13(41.0)	1		
51-60	21(87.0)	03(13.0)	0.16	0.03-0.95	0.044*
61-70	18(51.0)	17(49.0)	0.96	0.31-3.00	0.95
71+	14(38.0)	23(62.0)	1.9	0.62-5.84	0.26
Glasgow coma					
<9	09(24.0)	29(76.0)	1		
>9	63(70.0)	27(30.0)	0.15	0.05-0.43	0.001*
Temperature (0C)					
< 37.5	59(62.0)	35(37.0)	1		
>37.5	12(38.0)	20(63.0)	2.2	0.71-6.52	0.137
ESR					
<20	25(66.0)	13(34.0)	1		
>20	47(52.0)	43(48.0)	2.6	0.96-7.07	0.062

Legend:
*Statistically significant

REFERENCES

1. ADAMS HP, BENDIXEN BH, KAPPELLE LJ, BILLER J, LOVE BB, GORDON DH, MARSH EE. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. Stroke. 1993;24(1):35-41.
1. BANERJEE TK, ROY MK, BHOI KK. Is stroke increasing in India—preventive measures that need to be implemented. J Indian Med Assoc. 2005;103(3):162-166.
2. BRODERICK J, BROTT T, KOTHARI R. The Greater Cincinnati/Northern Kentucky Stroke Study: preliminary first ever and total incidence rates of stroke among blacks. Stroke. 1998;29:415-421
3. CARL C, MARTIN D. Systematic review of prognostic models in patients with acute stroke. Cerebrovascular Dis. 2001;12:159-170.
4. CONNOR MD, THOROGOOD M, MODI G, WARLOW CP. The burden of stroke in Sub-Saharan Africa. Am J Prev Med. 2007;33(2):172-3.
5. CONNOR MD, WALKER R, MODI G, WARLOW CP. Burden of stroke in black populations in sub-Saharan Africa. Lancet Neurol. 2007;6(3):269-78.
6. DALAL PM, BHATTACHARJEE M. Stroke epidemic in India: hypertension-stroke control programme is urgently needed. J Assoc Physicians India. 2007;55:689-91.
7. FEIGIN VL, LAWES CM, BENNETT DA, ANDERSON CS. Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century Lancet Neurol. 2003;2(1):43-53.
8. FRANK L, SILVER J, NORRIS W, ANTHONY JL, VLADIMIR CH. Early Mortality Following Stroke: A Prospective Review. Stroke. 1884;15(3).
9. GARBUSINSKI JM, VAN DER SANDE MA, BARTHOLOME EJ. Stroke presentation and outcome in developing countries: a prospective Study in the Gambia. Stroke. 2005;36:1388-1393.
10. GEEGANAGE CM, BATH PM. Relationship between therapeutic Changes in Blood Pressure and Outcomes in Acute Stroke: Hypertension. 2009;54:775.
11. GINSBERG MD, BUSTO R. Combating hyperthermia in acute stroke: a significant clinical concern. Stroke. 1998;29:529-34.
12. GUPTA R, JOSHI P, MOHAN V, REDDY KS, YUSUF S. Epidemiology and causation of coronary heart disease and stroke in India. Heart. 2008;94(1):16-26.
13. BRAUNWALD E, HAUSER S, LONGO D, LARRY JJ, FAUCI A. S. Harrison's Principles of internal medicine. Cerebral Vascular Disease, 16 edition, McGraw-Hill Professional. 2004; 2387.
14. KUMWENDA JJ, MATEYU G, KAMPONDENI S, VAN DAM AP, VAN LIESHOUT L, ZIJLSTRA EE. Differential diagnosis of stroke in the setting of high HIV prevalence in Blantyre, Malawi. Stroke. 2005;36(5):960-964.
15. MAKERERE- MBARARA JOINT AIDS PROGRAMME, Prevalence of HIV on medical wards at Mulago hospital, annual report. 2007.
16. Medical disability guidelines for definition of haemorrhagic stroke on computerised tomography scan.www.mdguidelines.com/intracranialhemorrhage/definition.
17. MLAY M, BAKARI M. The prevalence of HIV among patients admitted with stroke at the Muhimbili National Hospital, Dar es Salaam, Tanzania. Tanzania Journal of Health Research. 2010;12(2).
18. NAKIBUUKA J, BLONDIN N, NAMALE A, DDUMBA E. A descriptive epidemiological study on stroke in Kampala, Uganda: A hospital based study. AJNS. 2012;31(1).
19. OGUN SA. Acute stroke mortality at the Lagos University Teaching Hospital (LUTH) Nig. Quart. J. of Hosp. Med. 2000;10(1):8-10.
20. OGUN SA, OJINI FI, OGUNGBO BO, DANESI MA, KOLAPO KO. Stroke in South West Nigeria - a ten year review. Stroke. 2005;36 (6):1120 - 3.
21. OJINI FI, OGUN SA, DANESI MA. Thirty days case fatality of stroke at LUTH. Nig. Quart. J. of Hosp. Med. 2004;14(1):64-6
22. ONG TZ, RAYMOND AA. Risk factors for stroke and predictors of one-month mortality. Singapore Med. J. 2002;l43(10):517- 521.
23. Release of key results of the 2011 Uganda AIDs indicator survey. 2012.
24. ROSMAN KD. The epidemiology of stroke in an urban black population. Stroke. 1986;17:667-669.
25. SRIDHARAN SE, UNNIKRISHNAN JP, SUKUMARAN S, SYLAJA PN, NAYAK SD, SARMA PS, RADHAKRISHNAN K. Incidence, types, risk factors and outcome of stroke in a developing country: the Trivadrum Stroke Registry. Stroke. 2009;40: 1212-18.
26. The South Africa Stroke prevention initiative (SASPI) project team. Prevalence of stroke survivors in rural South Africa. Stroke. 2004;35:627.
27. WALKER RW, MCLARTY DG, KITANGE HM, WHITING D, MASUKI G, MTASIWA DM, MACHIBYA H, UNWIN N, ALBERTI KG. Stroke mortality in urban and rural Tanzania. Adult Morbidity and Mortality project. Lancet. 2000;355 (9216):1684-7.
28. World Health Organization. Stroke - 1989. Recommendations on stroke prevention, diagnosis, and therapy. Report of the WHO Task Force on stroke and other cerebrovascular disorders. Stroke. 1989;20:1407-1431.

29. YIKONA J. Prevention of hypertension and stroke in Africa. Lancet. 2000;356:678- 9.
30. YORIFUGI T, KAWACHI I, SAKAMOTO T, DOI H. Associations of outdoor air pollution with hemorrhagic stroke mortality. Journal of Occupational and Environmental medicine. 2011 Feb;53(2):124-126.