African Journal of Emergency Medicine xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

African Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/afjem

ORIGINAL ARTICLE

Prospective assessment of patients with stroke in Tikur Anbessa Specialised Hospital, Addis Ababa, Ethiopia

Ayalew Zewdie[a,*], Finot Debebe[b], Sofia Kebede[b], Aklilu Azazh[b], Adam Laytin[c], Golnar Pashmforoosh[d], Getaw Worku Hassen[e]

[a] AaBET (Addis Ababa Burn Emergency and Trauma Hospital)/St Paul Millinum Medical College, Department of Emergency Medicine and Critical Care, Ethiopia
[b] Addis Ababa University, Tikur Anbessa Specialized Hospital, Department of Emergency Medicine, Ethiopia
[c] Oregon Health and Science University, Department of Emergency Medicine, United States
[d] Semmelweis University School of Medicine, Budapest, Hungary
[e] NYMC, Metropolitan Hospital Center, Department of Emergency Medicine, United States

ABSTRACT

Introduction: The burden of stroke is increasing in many low- and middle-income countries. In Ethiopia, stroke has become a major cause of morbidity, long-term disability, and mortality. Time from stroke onset to hospital presentation is a critical factor in acute stroke care. This study aimed to describe risk factors for stroke and clinical presentation of patients presenting to the emergency centre with stroke.

Methods: We conducted a cross sectional study conducted from August 2015 to January 2016 in an urban tertiary care centre in Addis Ababa, Ethiopia. Descriptive statistics and multivariable logistic regression models were used to evaluate associations between stroke types and stroke risk factors, and delayed presentation and clinical indicators. P-values less than .05 were considered statistically significant.

Results: A total of 104 patients were included. The mean age was 53 years, and 56% were male. Only 30% of patients arrived using an ambulance service. The most common presenting symptoms were altered mental status (48%), hemiparesis (47%), facial palsy (45%), hemiplegia (29%), and aphasia (25%). Hypertension was the most common risk factor (49%), followed by cardiovascular disease (20.2%) and diabetes mellitus (11%). The majority of strokes were haemorrhagic in aetiology (56%). The median arrival time to the emergency centre was 24 h after symptoms onset; only 15% presented within three hours. Patients with hypertension, or presented with loss of consciousness were significantly more likely to have haemorrhagic stroke ($p < .001$ and $p = .01$ respectively). The only risk factor robustly associated with ischaemic stroke was cardiac illness (odds ratio 3.99, $p = .01$).

Discussion: Our study identified hypertension to be the most common risk factor for stroke. The predominant aetiology type in this cohort is haemorrhagic stroke. Lastly, the median arrival time to an emergency centre was 24 h after symptom onset.

African relevance

- Non-communicable diseases are rapidly rising in Africa.
- Current stroke management is perceived to be poor, especially in resource-limited settings.
- Different risk factors apply to an African population in the development of a stroke.
- Time to care is very important to save brain tissue but there are unique challenges in resource-limited settings.

Introduction

Globally, 16.9 million new cases of stroke occur each year, resulting in 5.9 million deaths, with over two-thirds of strokes and stroke deaths occurring in low- and middle-income countries (LMICs) [1]. It is estimated that over 87% of disability adjusted life years (DALYs) from stroke occur in LMICs [2]. With the absence of a significant global public health response, the burden of stroke is expected to increase to over 23 million total new cases and 7.8 million deaths per year by 2030 [3]. The continent of Africa is disproportionately affected by stroke due to population

Peer review under responsibility of African Federation for Emergency Medicine.
* Corresponding author at:
E-mail address: ayalew.zewdie@sphmmc.edu.et (A. Zewdie).

https://doi.org/10.1016/j.afjem.2017.11.001
Received 22 January 2017; Received in revised form 30 September 2017; Accepted 17 November 2017
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Table 1
Patient demographics versus time of emergency centre arrival.

Demographics		Time from onset of symptoms to EC arrival		p-value	Type of stroke		p-value
		≤6 h (n = 28)	> 6 h (n = 76)		Ischaemic (n = 46)	Haemorrhagic (n = 58)	
Age	< 35 years	4/28	10/76	0.83	6/46	8/58	0.82
	35–60 years	14/28	43/76		24/46	33/58	
	> 60 years	10/28	23/76		16/46	17/58	
Sex	Male	13/28	45/76	0.24	24/46	34/58	0.51
	Female	15/28	31/76		22/46	24/58	
Occupation	Farmer	7/28	26/76	0.63	13/46	20/58	0.64
	Government employee	2/28	9/76		6/46	5/58	
	Unemployed	11/28	25/76		18/46	18/58	
	Student	8/28	16/76		9/46	15/58	
Level of education	Not educated	13/28	42/76	0.82	26/46	29/58	0.55
	Elementary	6/28	14/76		6/46	14/58	
	High school	4/28	7/76		5/46	6/58	
	College/university	5/28	13/76		9/46	9/58	
Mode of arrival	Ambulance	10/28	21/76	0.54	13/46	18/58	0.20
	Private car/taxi	18/28	55/76		33/46	40/58	

growth, poor and under-developed healthcare systems, unchecked industrialisation, and the increased adoption of Western diets. These trends lead to increases in the prevalence of hypertension, diabetes, and obesity, all of which are significant risk factors for stroke [1,4].

Ischaemic and haemorrhagic strokes are medical emergencies that require emergent diagnosis and management. The critical area for intervention in an ischaemic stroke is the "ischaemic penumbra", the region of brain tissue that is threatened but viable after the occlusion of a cerebral artery. Facilities in high-income countries have access to thrombolysis techniques, such as tissue plasminogen activator (tPA), and angiographic interventions in order to effectively restore perfusion to the ischaemic penumbra, depending on patient presentation [5–7]. Even when these interventions are not available, facilities in high-resources settings have therapeutics to address dehydration, hypoxia, hyperglycaemia, extreme hypertension, and increased intracranial pressure; all of which can reduce the severity of long-term disability from stroke. In contrast, in LMICs, there are patient- and system-related factors that amplify the burden of stroke, especially delays in patient presentations. These delays result in missed opportunities for early interventions to stabilise stroke victims.

In Ethiopia, there is limited information available about the epidemiology of stroke, including lack of patient demographics and risk factors, clinical presentation, and barriers to care. These data are beneficial when creating public awareness programs, developing strategies for primary prevention, and improving access to care. The goals of this study are to describe factors associated with stroke and the clinical presentation of patients with stroke and to determine the rate of and reasons for delayed patient presentation, especially in low-resource settings.

Methods

We conducted a cross-sectional study in the adult emergency centre (EC) of an urban university hospital in Addis Ababa, Ethiopia, from August 2015 to January 2016. The study site is a tertiary referral hospital with neurological and neurosurgical expertise. We screened all patients presenting to the adult EC with stroke-like symptoms or altered level of consciousness for eligibility at the triage. All patients with CT-confirmed diagnosis of acute stroke were also included. We excluded patients with post-traumatic neurologic deficits or new stroke symptoms in the context of central nervous system lesions due to malignancy or infection.

After patients were evaluated and resuscitated by the clinical team, we requested informed consent from patients or a surrogate decision maker in cases of altered mental status or aphasia. If informed consent was granted, a trained data collector used a pre-tested, standardised questionnaire to collect data about the subject's background and medical history, and the nature and duration symptoms (Appendix A, Data supplement). We reviewed emergency centre clinical records for documented physical examination findings and results of laboratory investigations and radiographic examinations.

Our sample size calculation of 114 was based on a similar study conducted by Chalachew et al. [8]. We adjusted the formula for a population less than 5000, resulting in a minimum sample size of 65 patients for our study. We performed analysis using SPSS version 20. We used descriptive statistics as well as multivariable logistic regression models to evaluate associations between stroke types and stroke risk factors, and between delayed presentation and clinical indicators. P-values less than 0.05 were considered statistically significant. The study was approved by the Institutional Review Boards of the emergency centre and the university.

Results

A total of 104 patients were included in the study, of whom 58 were male (56%). The mean age was 53 years (standard deviation 17). Patient demographics, educational status, occupation and mode of arrival are summarised in Table 1.

Risk factors for stroke are summarised in Table 2. Fifty-one patients (49%) had at least one known risk factors for stroke. Hypertension (49%) was the most common stroke risk factor, followed by cardiac

Table 2
Risk factors versus type of stroke.

Risk Factor	Ischaemic stroke (n = 46) n (%)	Haemorrhagic stroke (n = 58) n (%)	p-value
Hypertension	21 (45.7)	30 (51.7)	0.001
Cardiac illness	15 (32.6)	6 (10.3)	< 0.01
Diabetes Mellitus	6 (13)	5 (8.6)	0.4
Previous history of stroke	3 (6.5)	3 (5.2)	0.7
HIV	1 (2.2)	3 (5.2)	0.48
Smoking	2 (4.3)	1 (1.7)	0.42
TIA	3 (6.5)	0	< 0.05
Family history of stroke	1 (2.2)	0	0.25

HIV, human immunodeficiency virus; TIA, transient ischaemic attack.

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