Assessment of stoke patients: Occurrence of unusually high number of haemorrhagic stroke cases in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

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Abstract: Introduction: Stroke is becoming a leading cause of death and adult disability in the developing world. The global burden of disease study indicates that 80% of stroke deaths occur in low- and middle-income regions. Objective: To assess the clinical characteristics and risk factors among patients presented with stoke in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. Methods and patients: This is a prospective cross sectional survey of all patients with stroke presenting to Tikur Anbessa specialized hospital for consecutive six months (November 2012-April 2013). The data included 114 stroke patients. Data of these patients was collected by an emergency medicine physician through a pre-designed questionnaire. Data was entered and analyzed by a computer software SPSS version 20. Monovariate analysis, bivariate analysis and multivariate analyses to control for confounder variables were done. CI which doesn't contain 1 is significant. Result: Out of the total patients seen, 63 (55%) were females with females to males ratio of 1.23 to 1.One quarter of patients (25%) were below 34 years of age followed by age greater than 65 and 55-64 years with 21% and 23.6% score respectively. The major risk factors identified were hypertension and Diabetes Mellitus with 69.3 % and 14.9% respectively. Nine (7.8 %) were found to be both hypertensive and diabetic. Atrial fibrillation is the third risk factor associated with stoke with a frequency of 11.4%. More than half of our patients (55.3%) had hemorrhagic stroke. Majority of the patients presented with sever neurological manifestations; hemiplegic deficit by 67 (58.8%), asphyxia by 16% and coma by 15.8 %of patients. Only 46 (40.4%) were on treatment and 7% of patients presented within the first three (golden) hours of onset of their illness; the majority of patients (41.2%) presented after 48 hrs. of onset of their symptoms. Those patients who presented with hemorrhagic stroke were 2.8 times (AOR=2.8, 95% CI: 1.5-7.7) to be presented with hemiplegic deficit as compared to those patients with ischemic stroke. Conclusion and recommendation: Stroke happened more frequently in women than in men and the risks associated with increased age were not evident. The major risk factors identified were high blood pressure and diabetes and atrial fibrillation. Hemorrhagic stroke associated with sever neurological presentations were the most prevalent stroke sub-types. Education of the public on active screening and prompt treatment and sign and symptoms of stroke together with improving the quality of stroke management are very crucial

Keywords: Stroke, Hemiplegic Stoke, Risk Factors

1. Introduction

Stroke is becoming a leading cause of death and adult disability in the developing world. The global burden of disease study indicates that 80% of stroke deaths occur in low- and middle-income regions. (1).

Sub-Saharan Africa faces the huge burden of the HIV/AIDS pandemic. Communicable diseases and malnutrition related disease dominate the causes of death in Africa, compared with non-communicable diseases in high-income countries. However, Africa may be increasingly affected by high burden of stroke and other vascular diseases due to health transitions in line with changing social, economic and demographic patterns. Non-communicable diseases are likely to overlap and persist for

a long time, imposing an additional burden to health care systems in the region.

In Ethiopia, Stroke is a frequent cause of mortality and morbidity. It has been shown to be the most common neurological condition seen in patients admitted to general hospital in Ethiopia. (2). Cerebro-vascular accident (CVA) was reported to account for 23.6% of all neurological admissions in Tikur Anbessa Specialized Hospital (TASH) (3)

Like other developing countries Resources for stroke care and rehabilitation are deficient in Ethiopia. Patients with stroke are often poorly managed and discharged from hospital without receiving adequate rehabilitation services. This has a series implication in terms of saving the life of patients especially in poorly developed societies where hemorrhagic stokes which are characterized by sever neurologic presentation are very much prevalent.

Given the high burden of CVA and associated inadequately equipped health settings, identifying and mitigating the risk of CVA can be seen as a prominent public health approach. Risk factors like HTN, atrial fibrillation, smoking, older age, African American race, diabetes and dyslipidemia have been identified in the literature. In Ethiopia, hypertension was the most important risk factor identified in 1990. However, during that time, computed tomography (CT) scan was not available to differentiate stoke sub-types and the modern approach in treating patients with strokes requires early CT scan as it is imperative to diagnose whether the stroke is ischemic or hemorrhagic.

In Ethiopia significant delays during the pre-hospital or in-hospital phases of care augmented by insufficient management of cases in the country is also making prognosis of stoke patients very poor. This is because of the fact that thrombolytic therapy has been proven to be beneficial if drugs are only administered within three hours after the onset of an ischemic stroke (5-9). To date following the advancement of technology, there have been no studies in our region investigating the risk factors for stroke. This is a crucial step to design an adaptable cost-effective approach to community-based stroke prevention. Moreover clinical setting readiness for the management common causes of stoke is vital. Considering the above facts, this survey will generate evidences for improving the clinical management and the prevention of stoke at community level.

2. Objectives

General objective: To assess the clinical characteristics and risk factors among patients presented with stoke in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia.
Specific objective
- To describe the clinical characteristics of patients presenting with stroke.
- To explore risk factors associated with stroke.

3. Methods and Patients

This is a prospective cross sectional survey of all patients with stroke presenting to TASH ER for consecutive six months (November 2012-April 2013).TASH is a national referral and teaching hospital providing health care to a large proportion of Ethiopian population.

The data included 114 patients of stroke aged 15- 80 years, irrespective of sex and community. Data of these patients was collected by an emergency medicine physician through a pre-designed questionnaire by completing a comprehensive history, detailed examination and carrying out basic and relevant investigations.

The definition of stroke given by the World Health Organization, WHO, as rapidly developing clinical signs of focal or global disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin (WHO1989)were applied to include these cases in this study (10). Patients with cerebral infarction, stroke in evolution, intra cerebral hemorrhage or subarachnoid hemorrhage who was approved by CT scan were included in this study. Findings on CT scans of brain, performed within 1 week of the onset of stroke were used for classification of the type of stroke. Ischemic type was diagnosed based on typical CT scan findings of infarct or a normal CT scan when it was performed within 2 days of the onset of stroke or the presence of a potential source of cerebral emboli such as the heart or carotid artery relevant to the side of stroke. Hemorrhagic was diagnosed based on clinical and CT scan findings. The data included patient's age, sex etc. The clinical neurological presentation and evaluation at the time of admission was classified as coma, confusion, hemiplegic, hemi paresis, aphasia, and convulsion. Risk factors analyzed in the study included hypertension (sustained systolic blood pressure >140 mm/Hg and a diastolic blood pressure > 90 mm/Hg) or both, diabetes mellitus was considered present if the patients were already diagnosed and receiving medication or the fasting blood glucose values were 126mg/dl, hyperlipidemia when the fasting cholesterol value was 6.7 mmol/lor triglyceride value 1.8 mmol/l, ischemic heart disease, post myocardial infarction, and atrial fibrillation, confirmed by standard ECG and by echocardiography .

Ethical clearance was obtained from AAU TAH ethical review committee. Patients had an informed verbal consent about the research. All patients will have the right to opt out of the research. For patients that have altered LOC, an appropriate substitute decision maker (i.e. close family member) will give the consent during their hospital stay then they will be re-consented by the study team.

Data was entered and analyzed by a computer software SPSS version 20.Monovariate analysis (mean, SD, frequencies and percentages), bivariate analysis using crude odds ratio and multivariate analyses to control for confounder variables were done. In a multivariate analysis, associations with demographic, clinical and neuro-imaging

factors were determined.CI which doesn't contain 1 is significant

4. Result

114 patients satisfying the clinical definition of stroke, whose data was collected over 06 months, were analyzed. The average age of presentation for these groups of patients was 50 years, the minimum being 15 and maximum 80 years with a standard deviation of 16.3 years.
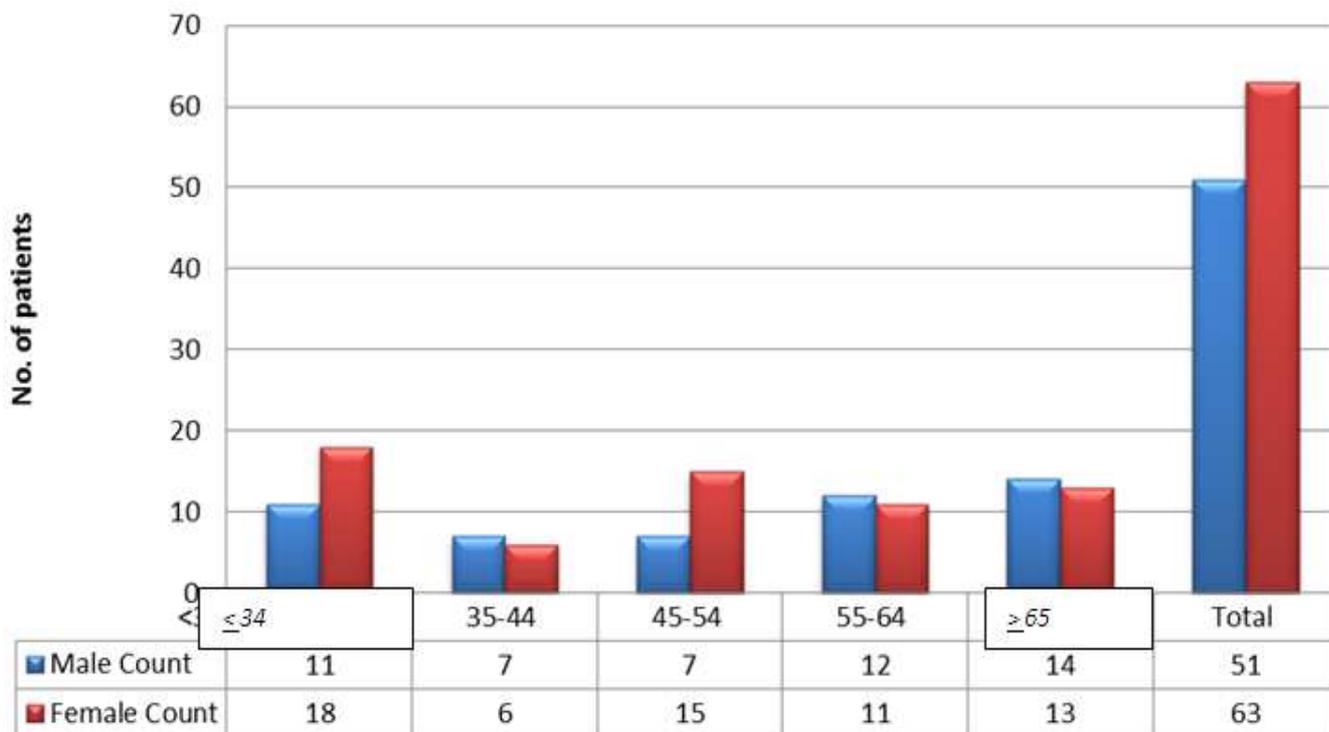

Figure 1. Numbers and percentages of stroke patients by age and gender, 2013Socio-demographic characteristics of patients

Among the total patients seen, 63 (55%) were females with females to males ratio of 1.23 to 1.Regarding their age distribution, majority of them (25%) were below 34 years of age followed by age greater than 65 years with 23.6% and age between 55-64 with 21%. See figure 1 above.

4.1. Risk Factors

The major risk factors identified were hypertension, Diabetes Mellitus, and Atrial Fibrillation especially associated with chronic rheumatic valvular heart disease. The two major risk factors identified are hypertension and Diabetes Mellitus with 69.3 % and 14.9% frequencies respectively. And nine (7.8 %) were found to be both hypertensive and diabetic. Atrial Fibrillation comes third with a frequency of 11.4%. Two of our male patients were smokers (0.9%) and four patients, one male and three female patients were diagnosed to have dyslipidemia prior to their presentation to the ER, and were on Statins. Eight of the patients had no known risk factor before, from which four of them were found to be hypertensive after their presentation to the ED, and one patient found to be diabetic, and still the other three remained not to have any identified risk factor for their stroke. Co morbidities like HIV infection were documented in only few patients, 5(4.4%). See table 1.

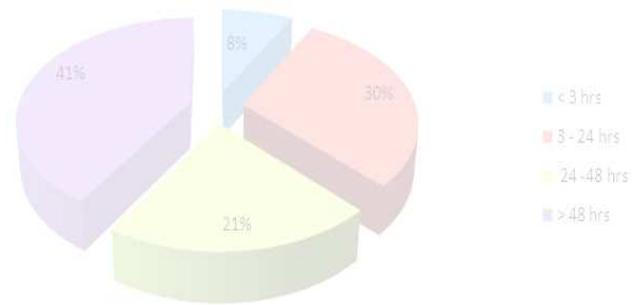*Table 1. Most important risks identified among patients presented with stroke, 2013*

Variable	Total	Percent	Remark
HTN	70	(61.4%)	
DM	8	(7%)	
Multiple risk factors	9	(7.8%)	HN and DM
AF	13	(11.4%)	
Smoking	2	(1.7%)	
Dyslipidemia	4	(3.5%)	
No known risk	8	(7%)	
Total	114	(100%)	

4.2. Level of Blood Pressure among Stroke Patients

As we can see below from the pie chart, 28.1% of patients presented with blood pressure in Stage 3 category and 31.6% were in the stage two range and only 22% presented with a blood pressure in the pre- hypertension range. See figure 2.
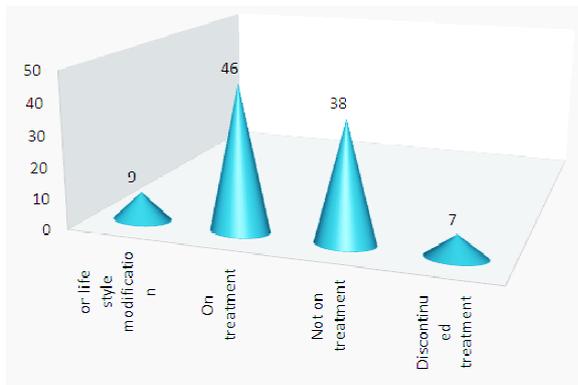
Figure 2. The initial Blood Pressure recorded at the ER on presentation of patients presented with stroke, 2013

4.3. Treatment Status of Patients

Among all patients who presented with stoke only 46 (40.4%) were on treatment. The details are shown below on figure 3.

Figure 3. Treatment status of patients presented with stroke in TASH, 2013Time of presentation

The other peculiar thing we noticed about stroke patients in this study was their time of presentation to the ER from the initial onset of their illness, around 7% of patients presented within the first three (golden) hours of onset of their illness. From the pie chart we see that the majority of our patients (41.2%) presented after 48 hrs. of onset of their symptoms.

Figure 4. Time of presentation to emergency room among patients with stroke in TASH, 2013Clinical presentation of stoke patients.

Pertaining to the clinical presentation that patients presented with, more than half, 67 (58.8%) patients presented with hemiplegic. See table 2

Table 2. Clinical presentation among patients presented with stroke in TASH, 2013

Variable	Total	Percent	Remark
Coma	18	15.8	
Confusion	18	15.8	
Aspasia	19	16.7	
Facial palsy	32	28	
Pelagic	67	58.8	
Paresis	47	41.2	

4.4. Previous and Family History of Stroke

Of all the stroke patients seen, 10 (8.8%) had recurrent stroke. The rest had a first time stroke episode. 5(4.4%) patients had family history of stroke.

4.5. CT Scan Results

More than half of our patients (55.3%) had hemorrhagic stroke and 35.1% had ischemic stroke. CT scan was not done 8.8 % of patients.

Table 3: Multiple logistic regression output showing factors affecting plegic presentation, TAH, 2013

Variable	COR,95%	95% C.I. for COR		AOR,95%	95% C.I. for AOR	
		Plegic	Paresis		Plegic	Paresis
stoke sub-types Haemorrhagic	3.38	1.491	7.661	2.819	1.305	6.092
Ischemic	1			1		
Age of patients						
≥55	3.322	1.035	10.662	2.593	0.864	7.777
35-54	1.02	0.424	2.454	0.978	0.426	2.245
≤34	1			1		
Sex Male	1.943	0.859	4.395	1.546	0.729	3.279
Female	1			1		

4.6. Factors Associated Neurologic Presentation

Logistic regression was used to assess the predictors of LOC, asphyxia and plegic presentation of patients. During the Binary logistic regression age, sex and stroke type were significant at 0.2 and entered in to multivariate analysis. In the multivariate model none of them were significant predictor of neither level of consciousness nor aphasias. However, only stroke sub-type showed a significant association with motor deficit presentation I.e. those patients who presented with hemorrhagic stroke were 2.8 times (AOR=2.8, 95% CI: 1.5-7.7) to be presented with plegic presentation as compared to those patients with ischemic stroke.

5. Discussion

Stroke is a medical emergency that requires prompt treatment. This study included 114 patients who presented with stoke in emergency room of TASH.

More than half of patients (56%) were below 55 years of age. Stroke in this study affected more women than men and as we discussed above increasing age was not a predictor of increased stoke cases. These findings were not in accordance with other studies carried out in developed countries (11-14). These studies found that the stroke incidence rate was higher in older age groups and in men rather than in younger age groups and in women. The age and gender distribution greatly differ from similar studies done in developed and many developing countries. These differences could be explained as follows. Even though, individuals under age 40 rarely have stroke related to atherosclerosis but other important risk factors such as diabetes, hypertension, hyperlipidemia, smoking, or a strong family history especially when left untreated could cause stroke. Almost all patients in this research have the above mentioned risk factors. Beside, hemorrhages (both ICH and SAH) are common in adolescents and young adults [15]. The fact that most patients in this study had hemorrhagic stroke could also support findings. Moreover, false age can't be ruled out as most of them were cases that were referred from different hospitals of the country including rural settings. Similarly, premenopausal women have a lower frequency of atherosclerosis than men of similar age unless they have major stroke risk factors. In-addition, while data are limited, stroke prevalence may be increasing in women aged 45 to 54 years [16].On the other hand, more than 50% Patients in this survey were not under treatment. The occurrence of stroke could have been delayed to the later age if patients were receiving treatment.

The other strange finding of this study is the appearance of very high numbers of hemorrhagic stroke patients. Out of the 114 patients seen with stroke, 55.3% had hemorrhagic stroke and only 35.1% had ischemic stroke. This is very unusual and opposite to most Western and developing country literatures which showed that the majority of strokes were due to blockage of an artery in the brain by blood clot (17, 18). This may be due because of untreated high blood pressure is a common cause of hemorrhagic strokes; in this study we found that hypertension was the most important risk factor and as mentioned above more than half of patients presented in this hospital were not on treatment. The fact that the hospital is a national referral center may be related to increased number of hemorrhagic stroke as referring hospitals are likely to manage mild stroke patients which are mostly linked with ischemic stroke.

As elsewhere, most important risk factor identified is hypertension which is either uncontrolled or poorly controlled. Diabetes and AF associated with Chronic Rheumatic heart disease are second and third major causes. These findings agree with other research findings done in developed and developing countries which documented that hypertension is the leading risk factor for stroke.(11-14).Similarly, heart disease, including atrial fibrillation, valvular disease, recent myocardial infarction, and endocarditic, increases the probability of a stroke due to embolism [19-21]. Of these, atrial fibrillation is the most prominent, causing nearly half of all cardio-embolic strokes.

Smoking and hypercholesterolemia are seen only in few of our patients presented with stroke. Smoking was not a common risk factor. Dyslipidemia were not consistently diagnosed as most of our patients did not have their lipid profile determined in the ER. And a minority of patients had no risk factor identified from the history and previous data from the chart. However some of these patients were found to be hypertensive or diabetic on their presentation to the ER, but few had no identifiable risk factor throughout their whole stay. Nine patients were found to be both hypertensive and diabetic.

The majority of patients (41.2%) presented after 48 hrs. of onset of their symptoms. The fact that the majority of our patients come late, creates management difficulties as these first hours are important to avoid secondary insults to the brain and preserve the ischemic penumbra. Also such late presentation would make advanced treatments like thrombolytic, impossible in the future when our hospital gets these drugs. Thrombolytic therapy has been proven to be beneficial if administered within three hours after the onset of an ischemic stroke (5-9). Significant delays during the pre-hospital or in-hospital phases of care may render patients ineligible.

The most common presentation was hemiplegic (58%). This figure is significantly greater than other studies (12-14). This may be due to in part by delayed presentation for treatment and majority of patients were not receiving treatment. Asphyxia and comma were the other presentations of the patients. Hemorrhagic stroke more than ischemic stroke is associated with worsened clinical presentations. This is supported by other studies (22, 23) which reported that reduced alertness accompanying neurologic signs are suggestive of the presence of hemorrhage.

In this study, 8.8 % of stroke patients presented to the hospital were classified as 'recurrent strokes'. The percentage of recurrent strokes was lower than the findings of other study, which was approximately 10% of stroke events (24). A possible explanation of the different rates of recurrent stroke in these two studies could be the different research designs and cultural backgrounds of the people in these two countries. However, the problems of access to services which can help control these factors may increase the chance of people who have had first strokes having second strokes. Due to the health care, health insurance systems, the country's poor economic situation, patients may have difficulties accessing medical clinics and medicines, and may therefore be at high risk of recurrent stroke.

Regarding risk factors associated with clinical presentation of cases in this study, age, and sex and stoke sub-type were neither significant predictor of neither level of consciousness nor aphasias. However, stroke sub-type showed a significant association with hemiplegic presentation. Those patients who presented with hemorrhagic stroke were 2.8 times (AOR=2.8, 95% CI: 1.5-7.7) to be presented with plegic presentation as compared to those patients with ischemic stroke. This is due to the fact that hemorrhagic strokes are mostly associated with moderate to severe clinical presentation of cases.

6. Conclusion

In general, in this survey, stroke occurred more frequently in women than in men and the risks associated with increased age were not evident. The major risk factors identified were high blood pressure and diabetes and atrial fibrillation. Hemorrhagic stroke were the most CT scan findings. Most stroke patients presented to the hospital with severe neurological manifestations including hemiplegia, coma and asphyxia. Most patients were not on treatment and most of them hadalso difficulties in accessing timely CT scan services. Hemorrhagic stroke was the only predictors of hemiplegic presentation.

7. Recommendation

In poorly health setting where intensive care units are lacking, education of the community on risk factor prevention for stoke should be emphasized. Education should also be given to the public to effectively lower blood pressure in hypertensive patients and decrease the burden of stroke from DM and atrial fibrillation troughs active screening and prompt treatment. Also education should be given to the public on the sign and symptom of stroke, so that they seek medical help early. Primary care physicians should also try their best to effectively treat hypertension and Diabetes, the most common risk factors identified for stroke. Well-equipped and staffed intensive care units are advisable for management of moderate to severe stroke cases. First of all, studies that attempts to assess delays for treatment and to determine some of the factors that impede timely presentation in patients with strokes are advisable to address those issues further.

Limitation of the Study

This study has some limitations. Conducting this survey on large sample size with measurement of the lipid profile of patients could have been the better way to understand about the patients and risk factors associated with stoke in our setting.

Abbreviations

AAU, Addis Ababa University; AOR, Adjusted Odds Ratio;CI, Confidence Interval; COR, Crude Odds Ratio; CT, Computed Tomography; CVA ,Cardio-vascular accident; DM, Diabetic Mellitus; ER, Emergency room; HIV, Human Imuno-Deficiency Virus; ICH, Intracranial hemorrhage;LoC, Loss of Consciousness; TASH, Tikur Anbessa Specialized Hospital; WHO, World health organization, SD, Standard Deviation.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

CM contributes in the design the study and also made the data analysis and interpretation of the data and write up the manuscript. SK contributed to the design of the study, data collection and data entry. All authors critically revised the manuscript and have approved the final manuscript.

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