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Types, risk profiles, and outcomes of stroke patients in a tertiary teaching hospital in northern Ethiopia

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ABSTRACT

Background: Stroke is becoming an increasingly serious public health issue in Ethiopia and the paucity of data specific to the Ethiopian setting is limiting the formulation of an appropriate response.
Objective: This study aimed to describe types, risk factors, management patterns, and outcomes among stroke patients treated at a tertiary teaching hospital in northern Ethiopia from 2012 to 2014.
Design: Medical record review with a standardized abstraction tool was used to obtain all data for this retrospective case study. Data was entered in EpiInfo Version 7 and analyzed using STATA12. Descriptive statistics were used to explore differences among stroke subtypes and compare with other sub-Saharan African countries.
Results: Among 142 stroke patients (mean age 62.8 ± 15.6 years, 54.2% male), ischemic stroke was the most frequent subtype (55.6%) followed by intracerebral hemorrhage (32.4%) and subarachnoid hemorrhage (5.6%). 38.0% of patients had pre-existing hypertension and 4.9% had pre-existing diabetes, and most were not on any treatment. 66.2% of patients were hypertensive at hospital arrival and nearly all presented with focal neurological deficit. Less than 10% arrived at the hospital within 3 h of stroke; nearly half (47.9%) were delayed over 24 h. 76.1% received CT Scan. We observed 12.0% in-hospital mortality.
Conclusions: Ischemic stroke was the predominant form of stroke, although to a lesser degree than in studies from developed countries. Under-diagnosing of hypertension and other risk factors and delayed presentation at the hospital are the major challenges to address.

1. Introduction

Recent studies have revealed that Ethiopia is beginning to enter the epidemiologic shift, where the burden of non-communicable diseases (NCDs) such as cardiovascular disease (CVD), cancers, diabetes, chronic respiratory diseases, and injury is increasing while communicable diseases simultaneously remain highly prevalent [1]. According to the WHO, NCDs are estimated to account for 30% of all deaths in Ethiopia [2], with stroke being one of the most prominent of the NCDs. The Global Burden of Disease Project stated that in 2010 stroke caused 642,000 years of life lost (YLL) due to premature mortality, a 31% increase in stroke-attributable YLL since 1990. Compared with other causes of burden, stroke ranked as the most burdensome NCD and the 13th highest overall cause of YLL in Ethiopia in 2010 [3]. A 2012 surveillance study done on adult deaths in Addis Ababa showed that NCDs accounted for 51% of all mortality, with cerebrovascular accident or stroke accounting for 11% of all-cause mortality and 37% of NCD mortality [1].

It has been estimated that 68% of adult Ethiopians in the country's capital city, Addis Ababa, have one or more of the following CVD risk factors: daily smoking, regular khat chewing, binge drinking, obesity, abdominal obesity, physical inactivity, or high blood pressure [4]. Although currently there exists a pronounced urban–rural gradient in the prevalence of these risk factors, the differential is narrowing as the population urbanizes [4]. Well-established cohort studies in the United States have demonstrated that stroke risk varies by race and ethnicity [5], so Ethiopians may also experience different risk factors from those associated with stroke in other populations, or at least the risk factors might occur at a different magnitude or

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relative importance. For example, a study done by Ethiopian-born physicians residing in the United States found that the average body mass index (BMI) at which most Ethiopians develop type-2 diabetes mellitus is 25 kg/m^2 (Dr Elias S. Siraj MD, FACP, FACE, Professor of Medicine; Director, Diabetes Program; Program Director, Endocrinology Fellowship Temple University School of Medicine and Hospital, 2010). However, two national surveys conducted in the United States found that more than 75% of diabetes, hypertension, and dyslipidemia patients had a BMI greater than 25 kg/m^2 [6]. This comparison suggests that Ethiopians may develop type-2 diabetes mellitus at a lower than typical BMI. The WHO 2014 Africa Regional Health Report states that risk factors like obesity, hypertension, diabetes mellitus, dyslipidemia, and chronic rheumatic heart disease tend to occur at younger ages in the African Region than in many developed countries [7,8]. In addition, several prior hospital based studies conducted in Ethiopia reported unusually high proportions of hemorrhagic stroke [9,10,11], suggesting that there may be distinctive factors affecting the dynamics of stroke in the Ethiopian population.

Thus, this study was conducted to further build the evidence based on stroke in the Ethiopian population through studying the types of stroke, the demographic characteristics, and the treatment outcomes among stroke patients treated in Mekelle University Ayder Referral Hospital.

2. Materials and methods

2.1. Study design

This retrospective medical record review study was conducted in Mekelle University Ayder Referral Hospital, a tertiary level hospital located in northern Ethiopia with an estimated catchment area of 5 million people. The study used convenience sampling, selecting all consecutive patients above the age of 18 years with a diagnosis of stroke or transient ischemic attack (TIA) during a two year period (March 2012–February 2014) [12]. The study period was bound by the date when the hospital acquired a computed tomography (CT) scan machine in March 2012. However, patients diagnosed without neuro-imaging were still included in the study because not all suspected stroke patients get CT Scans due to economic or other reasons.

2.2. Data collection

Stroke and TIA cases were identified through review of handwritten admission and discharge logbooks from the adult Intensive Care Unit and Medical Wards. Each medical record number with a recorded admission diagnosis of “stroke”, “hemiparesis”, or “transient ischemic attack” was submitted to the medical record room for chart retrieval.

Data was abstracted from the patient's medical records by seven trained final year medical students blinded to the study hypothesis using a standardized, pre-developed paper data abstraction instrument in English, based on the study's data abstraction procedural guideline which clearly defined the inclusion and exclusion criteria, the variables' locations in the medical record, variable definitions, and treatment of missing data [13]. Each event was classified as being the patient's first-ever-in-a-lifetime clinically evident stroke or TIA, as confirmed through CT Scan findings or a neurological evaluation during hospitalization. The data abstraction tool was first piloted on 30 cases to check the consistency and understandability of the format. This was based on the assumption that we would find approximately 300 cases, using 10% for the pilot study [12]. Modifications were made to the abstraction format based on data quality checks. The final version of the data abstraction tool is included in Appendix A. Data abstractors were randomly checked for interrater reliability of their abstraction using weighted kappa statistics calculated on selected variables [12].

2.3. Data processing and analysis

All data were entered using EpiInfo Version 7 and analyzed using STATA 12. Statistics such as means, standard deviations, medians, and interquartile ranges were calculated to describe the typology of stroke, demographic characteristics, prevalence of risk factors, and treatment outcomes among stroke patients at Ayder Referral Hospital.

2.4. Ethics statement

This study did not involve human or animal subjects. All data was deidentified and assigned identification numbers during the process of data computerization. Ethical clearance was obtained from the Institutional Review Board of Mekelle University, College of Health Sciences. This study was approved by the Institutional Review Board of Mekelle University, College of Health Sciences.

3. Results

The hospital's Health Management Information System (HMIS) reported 291 stroke cases during the two year study period from March 2012 to February 2014 (Ayder Hospital HMIS Office). A total of 236 unique stroke cases were identified by reviewing the hospital's admission log books, with 160 admissions to the Adult ICU and 76 to the Medical Wards. From these, about one quarter (26.6%, N = 63) of the medical records were missing from the medical record room and 31 (13.1%) were not stroke patients upon review of the chart. Finally, 142 stroke patients treated in Ayder Referral Hospital during the two year study period were included in the study, or 49.1% of the 291 strokes originally reported by HMIS for the study period.

3.1. Demographic characteristics

The mean age of stroke patients was 62.8 ± 15.6 years, ranging from 19 to 93 years. Stroke in the young, defined by age less than 45 years, accounted for 12% of the total patients, while nearly half (45.1%) of the total patients were below 65 years of age. The majority of stroke patients were male (54.2%) and from urban areas (59.2%). Data was unavailable for several basic demographic characteristics of interest. For example, educational level (98.6%, N = 140) and occupation (87.3%, N = 124) were unrecorded for nearly all patients in the study. Table 1 shows the demographic characteristics of the stroke patients in the study by stroke subtype.

3.2. Stroke subtypes

Ischemic stroke was the most frequent stroke subtype (55.6%, N = 79) followed by intracerebral hemorrhage (32.4%, N = 46), subarachnoid hemorrhage (5.6%, N = 8), other types of stroke (4.9%, N = 57), and transient ischemic attack (1.4%, N = 2).

3.3. Antecedent risk factors

Table 1 shows the frequency of identified antecedent risk factors by stroke subtype. History of hypertension was the most common antecedent risk factor identified in a total of 54 (38.0%) patients. History of diabetes was identified in a total of 7 (4.9%) patients. From these, 5 (3.5%) had a comorbid history of diabetes and