Acute Stroke Patients with Newly Diagnosed Diabetes Mellitus Have Poorer Outcomes than Those with Previously Diagnosed Diabetes Mellitus

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Background: Diabetes mellitus (DM) is associated with poor outcomes in acute stroke patients (ASPs). This study aims to determine the prevalence of NDDM in the ASPs and to compare the outcome in NDDM and previously diagnosed DM (PDDM) in Cameroon. *Methods and Materials:* This was a hospital-based prospective cohort study that included ASPs with NDDM and PDDM. Outcome data were collected within 3 months of stroke onset. Chi-square and *t* tests were used for comparisons, whereas survival analysis was performed using Cox regression and Kaplan–Meier analysis. *Results:* Of the 701 ASPs included, 24.8% had PDDM (n = 174) and 9.4% NDDM (n = 66). NDDM had a higher mortality rate on admission and 3 months after stroke ($P < .05$). PDDM were more likely to survive within 3 months after stroke onset (log-rank test $P = .008$). The risk of dying among NDDM was increased (adjusted hazard ratio = 1.809; 95% confidence interval: 1.1532.839; $P = .010$). NDDM were more likely to have higher mean National Institutes of Health Stroke Scale and modified Rankin score ($P < .05$) on admission. PDDM were more likely to develop urinary tract infections during hospitalization ($P = .015$). There was no significant difference between functional outcome on admission and 3 months after stroke ($P > .05$). *Conclusion:* NDDM are associated with increased mortality and are more likely to have poorer functional outcomes and more severe stroke than those with PDDM. **Key Words:** Newly diagnosed diabetes mellitus—outcome—prognosis—Sub-Saharan Africa.

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Introduction

Stroke is the second most common cause of death and major cause of disability worldwide.[1,2] Sub-Saharan African countries are currently facing an epidemiological transition with an increasing prevalence of diabetes mellitus (DM) alongside other noncommunicable diseases.[3] DM is one of the established risk factors for stroke.[4] Like in many other countries in Africa, there is a scarcity of data on the prevalence of diabetes in Cameroon. The prevalence of diabetes is 5.7% in urban Cameroon, with an estimated 1 million population with diabetes, of which 70%-80% remains undiagnosed.[5] Patients presenting with stroke are more likely to have undiagnosed type 2 diabetes.[6,7] Diabetes is one of the vital comorbidity risk factors reported to be associated with occurrence, poor outcome, and recurrence in stroke patients.[8-10] Hyperglycemia on admission is also strongly predictive of poor clinical outcome and high mortality.[11-15] Diabetes is a common comorbidity in patients with stroke and is associated with poor outcomes after stroke.[16,17] Very few studies have compared the outcome in patients with stroke with previously diagnosed DM (PDDM) and those with newly diagnosed DM (NDDM).[18,19] In sub-Saharan Africa, little data are available on the association between diabetes and stroke and especially regarding the outcome among acute stroke patients (ASPs) with NDDM. Thus, comparing the clinical pattern and the outcome in the ASPs with PDDM and NDDM is necessary for optimal management and stroke prevention in this group of patients. Therefore, our objectives were to determine the prevalence of NDDM in acute stroke and to evaluate the mortality and functional outcome in the ASPs with PDDM compared to those with NDDM.

Methods and Materials

Patients and Study Design

We carried out a hospital-based prospective cohort study in a tertiary care hospital in Douala, Cameroon. We included all consenting patients admitted for acute stroke (both ischemic and hemorrhagic) in the neurology unit and the intensive care unit of the Douala General Hospital from January 2010 to January 2016. This study was approved by the Institutional Ethics Committee of Research on Human Health of the University of Douala and the study hospital (Douala General Hospital). The identity of patients was concealed and confidentiality of information was preserved. Patients who were admitted for confirmed acute stroke within 7 days of onset of symptoms were included in our study. Patients with cerebral venous thrombosis and subarachnoid hemorrhage were excluded. These patients were included in a stroke registry after the diagnosis of stroke was confirmed.

Data Collection and Patient Management

At presentation, demographic data including age, sex, and known relevant medical history such as DM, hypertension, history of smoking, alcohol abuse, and chronic kidney disease were recorded. Other cardiovascular events such as atrial fibrillation, congestive heart failure, coronary artery disease, and ischemic heart disease were recorded. Baseline vital and anthropometric parameters such as blood pressure, pulse, respiratory rate, oxygen saturation weight, height, and abdominal circumference values were recorded using standard operating procedures. Hypertension, DM, dyslipidemia, alcohol consumption, and obesity were defined as in the previous published study by Mapoure et al in 2014.[20] DM was defined as a random plasma glucose level of 200 mg/dL or higher and/or in-hospital fasting glucose of 126 mg/dL or higher on 2 or more occasions and/or glycated hemoglobin (HbA1c) of 6.5% or higher. Metabolic syndrome was defined as per the National Cholesterol Education Program Adult Treatment Panel III guidelines.[21] Patients with severe conditions like a Glasgow coma scale of less than 8 of 15 or septic shock were directly admitted in the intensive care unit, whereas other cases were hospitalized in the neurology unit.

Blood samples were collected from all patients during the first 24 hours of admission to check fasting blood sugar, complete metabolic panel (urea, creatinine, uric acid, and electrolytes), HbA1c, and lipid profile using the Cobas 311 autoanalyzers (Roche Diagnostics GmbH, Mannheim, Germany). A full blood count with platelet counts, prothrombin time, cephalin-kaolin time, C-reactive protein, erythrocyte sedimentation rate, and human immunodeficiency virus serology were done. Other tests were prescribed if required by the patient's conditions: chest x-ray, urine culture, hemoculture, and thick blood film to check for plasmodium falciparum. A neurological assessment was done by a neurologist or intensive care specialist. Interpretation of CT scans was done by both radiologist and neurologist and their findings were recorded. The type of stroke and ischemic stroke subtypes were also recorded. Electrocardiography was systematically done for patients with ischemic strokes and for hypertensive patients with hemorrhagic strokes. For patients with ischemic stroke, transthoracic and supra-aortic Doppler ultrasound was done, except for those with severe conditions. On admission and 3 months after stroke, the Glasgow coma scale and the National Institutes of Health Stroke Scale were used to determine the stroke severity, whereas the functional outcome was evaluated by the modified Rankin score (mRS). Stroke death and stroke recurrence during admission and 3 months after stroke were also recorded. Poor functional outcome was considered in patients with mRS higher than 2 within the first 3 months after stroke discharge. Follow-up was done daily for clinical evaluation and complications were noted. Oxygen was administrated if ambient oxygen