Stroke Subtypes and Comorbidity among Ischemic Stroke Patients in Brasilia and Cuenca: A Brazilian–Spanish Cross-cultural Study

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Background: With the increase in life expectancy worldwide, changes in stroke subtypes and burden of stroke population are expected in both developing and developed countries. Prevalence of stroke subtypes and comorbidity in ischemic stroke patients was assessed in Brasilia, Brazil, and Cuenca, Spain. *Methods:* This was an international (Brazilian-Spanish) cross-sectional study. Stroke subtypes were assessed by means of Trial of ORG 10172 in Acute Stroke Treatment (TOAST) classification. Modified Rankin scale was used to measure functional recovery and the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) was used to assess comorbidity. *Results:* A total of 500 patients (mean age 66.2 ± 16.4 years; 48% female; 48.2% Spanish) were included in the study. Spanish patients were significantly older than Brazilian ones (76.4 ± 11.2 versus 56.7 ± 14.6 years; $P < .0001$). Prevalence of ischemic cardiopathy (20.3% versus 6.2%) and atrial fibrillation (25.7% versus 6.6%) was significantly higher in Spanish stroke patients, whereas they less frequently used tobacco (28.3% versus 52.9%); P less than .0001. Prevalence of stroke subtypes in Spanish and Brazilian stroke patients was: stroke of undetermined etiology (58.1% versus 32.4%), cardioembolism (24.5% versus 11.6%), lacunar infarct (11.6% versus 25.5%), atherothrombotic (3.7% versus 19.7%), and other causes (2.1% versus 10.8%); P less than .0001. The Spanish sample had a significantly higher frequency of comorbidities. The CIRS-G total score and CIRS-G mean number of affected organs significantly increased with age, and correlated with the level of functional dependence as measured by Rankin scale ($r_S = 0.50$; $P = .0005$). *Conclusion:* Spanish stroke people had a higher frequency of comorbid conditions, atrial fibrillation, and cardioembolism and these facts were associated with age. Atherothrombotic and lacunar strokes were more common in the younger Brazilian stroke population. **Key Words:** Atrial fibrillation—cross-cultural—elderly—health care disparities—stroke—stroke subtypes.

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The increase in life expectancy is a growing phenomenon worldwide that may have important consequences for the organization of health care systems.[1] With the progressive aging of the world population, changes in prevalence and global burden of stroke population are expected.[2]

In many developed and even developing countries, the elderly population is the fastest growing segment of the population. In central Spain, the very elderly population older than 75 years is rising rapidly, and stroke burden and comorbidity is expected to increase, too. Brazil is the largest country in South America with a population of approximately 200 million inhabitants and the elderly population is expected to rise in the next years and decades.

The observed changes in geographic patterns of neurological diseases are important issues in analyzing multinational clinical trial results.[3] Geographic and cross-cultural comparisons of stroke subtypes and comorbidity between countries are valuable for identifying preventive interventions for aging-related stroke.[4-7]

The purpose of this study was to assess cross-cultural differences in the prevalence of comorbidity and stroke subtypes in ischemic stroke patients from 2 regions of the world. These new data may have a clinical impact in the understanding of stroke associated with aging and help us to develop adequate health care programs.

Methods

Patients

This was an international clinic-based cross-cultural study performed in South America (Brasilia DF, Brazil) and Europe (Cuenca, Spain). Ischemic stroke patients consecutively admitted to hospital during a 1-year period (2009-2010) were included in the study. Patients were recruited in 2 general neurology wards from Cuenca and Brasilia DF hospitals and they were representative of an urban middle-socioeconomic class. Patients were not treated in a stroke unit.

Assessments

Stroke was defined as a focal deficit of sudden onset that lasted at least 24 hours with no known alternative to a vascular cause,[8] and was confirmed by clinical examination and radiological findings on brain computed tomography scan and/or magnetic resonance imaging (MRI). Patients with cerebral hemorrhage, subarachnoid hemorrhage, subdural hematoma, or transient ischemic attack were excluded from the study. For the purpose of this research, both first-ever and recurrent ischemic strokes were included. Stroke workup diagnosis and protocols were similar in both institutions, and stroke subtype diagnosis was reviewed by the first author.

Data were collected on age, sex, occupation, vascular risk factors, associated comorbidity, stroke etiology, and functional recovery. Stroke workup diagnosis was based on clinical diagnosis completed by carotid and vertebral ultrasonography, transcranial Doppler, echocardiography (transthoracic, transesophageal, or both), brain computed tomography scan and/or MRI, and angiography when needed, as well as standardized and specific (thrombophilia) blood tests.

Assessments were made with the following instruments: (1) the Trial of ORG 10172 in Acute Stroke Treatment (TOAST) criteria[9]; (2) the Oxfordshire Community Stroke Project classification[10]; (3) the modified Rankin scale (m-RS)[11]; and (4) the Cumulative Illness Rating Scale adapted for geriatric population (CIRS-G).[12]

The TOAST criteria[9] were used to define the following ischemic stroke subtypes: (1) cardiac embolism due to atrial fibrillation diagnosed on electrocardiography, valve disease, atrial septal aneurysm or intracavitary thrombus, or the presence of other high- or medium-risk cardiac source of embolism on echocardiography; (2) small vessel disease/lacunar infarct (LACI) from lipohyalinosis of small artery, defined as a subcortical infarct (<15-mm diameter) on brain computed tomography/MRI in the absence of any other morphologic cause of stroke found on carotid Doppler/echocardiogram examinations; (3) atherothrombotic/large vessel disease, defined as an ischemic stroke from atheroma plaque of large arteries on carotid Doppler/angio-MRI/angiography; (4) stroke of undetermined etiology, including patients with 2 or more causes identified, and patients with negative or incomplete evaluation; and (5) "other causes of stroke" included patients with relatively uncommon causes of ischemic stroke such as carotid or vertebral artery dissection, post-surgery stroke, hypercoagulable states, or hematologic disorders. When it was difficult to differentiate between stroke subtypes, medical staff meetings were held to classify the etiology of stroke.

Ischemic stroke was also categorized based on clinical presentation, location, and extent of cerebral infarction, according to the Oxfordshire Community Stroke Project classification as follows: total anterior circulation infarct, partial anterior circulation infarct, posterior circulation infarct, and LACI.[10]

The m-RS was used to measure functional recovery and global functional independence at discharge.[11] The m-RS is defined categorically with 7 different grades: 0 (no symptoms); 1 (no significant disability, despite symptoms); 2 (slight disability; unable to perform all previous activities but able to look after own affairs without assistance); 3 (moderate disability; patient requires some help, but is able to walk without assistance); 4 (moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance);