Risk Factors, Subtypes, and Outcome of Ischemic Stroke in Kuwait: A National Study

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Background and Purpose: Epidemiological studies of stroke burden in Kuwait are scarce. We aimed to identify the risk factors, subtypes, and outcome of ischemic stroke in the 6 major hospitals in Kuwait between 2008 and 2013. *Methods:* A cross-sectional survey was carried out using randomly selected ischemic stroke patients. It included data of sociodemographic status, stroke risk factors, stroke subtypes, treatment, and outcomes. *Results:* A total of 1257 ischemic stroke patients (811 men and 446 women; mean age 60.2 ± 13.1) were included. Small-artery ischemic stroke was the most common stroke subgroup (69.8%) whereas hypertension was the most prevalent risk factor (80.9%). History of heart disease was significantly associated ($P < .001$) with cardioembolic strokes (58.3%) compared to large-artery stroke (37.5%) and small-artery stroke (32.5%). Atrial fibrillation was significantly prevalent ($P < .001$) in cardioembolic stroke (54.2%) compared to large-artery stroke (13%) and small-artery stroke (7.6%). Presentation at ages less than 45 years was significantly ($P < .001$) associated with improved neurological status at discharge (82.6%) when compared to patients aged 45-70 years (78.5%) and more than 70 years (63.8%). Similar findings were observed at 6 months follow-up (78.4% versus 72.8% and 46%; $P < .001$). Cardioembolic stroke was significantly associated with higher mortality rates (25% versus 12.4% and 6.8%; $P < .061$) in large-vessel and small-vessel strokes, respectively. *Conclusions:* Small-artery ischemic stroke was the most common stroke subgroup, and hypertension was the most common risk factor. The outcome was better in younger patients. Cardioembolic stroke was associated with worse outcome. **Key Words:** Ischemic stroke—risk factors—outcome—cardioembolic—Kuwait.

Introduction

The epidemiology of stroke is changing over time because of the increase in the proportion of the aging population and recent advances in the prevention and treatment of stroke.[1] Continuing industrialization with the additional factor of unhealthy lifestyles has been shown to impact on the incidence and prevalence of stroke.[2] Stroke is increasingly becoming a major health burden, with projections that mortality would nearly double by year 2030 in the Middle East.[3] It is the leading cause of functional impairments, with 20% of survivors requiring institutional care after 3 months and 15%-30% being permanently disabled.[4] Epidemiological studies have improved the

regulatory awareness of the burden of stroke on the population. The short-term and long-term consequences of stroke have been shown to impact the socioeconomic status of the affected patients and caregivers.[1] Since stroke prevention appeared to be effective in reducing the burden of neurological disabilities, identification and quantification of stroke risk factors, particularly those that are modifiable, are of significant interest. There was a difference in the previous 2 studies that were conducted in Kuwait. The Al-shammri et al[5] study showed that the most common stroke subtype is lacunar infarctions, in contrast to Abdul-Ghaffar et al[6] study that reported large infarcts were the commonest. In addition, there was an alarming observation in Al-Shammri et al[5] study, which revealed that the outcome in women was worse than that of men. This was different from the study done by Abdul-Ghaffar et al,[6] which stated that there was no difference in the morbidity and mortality between the genders. The fact that both studies were done in Kuwait with different results needs further investigations.

We aim to identify the risk factors, subtypes, and outcome of ischemic stroke in the 6 major hospitals in Kuwait between the years 2008 and 2013.

Methods

Study Design and Population

This cross-sectional study assessed ischemic stroke patients presented to the 6 major general hospitals of Kuwait between January 2008 and December 2013. It included patients with new and recurrent strokes. Stroke was defined according to the WHO (World Health Organization) stroke criteria.[7] Transient ischemic attacks (TIAs), hemorrhagic strokes, stroke of undetermined etiology, and traumatic brain injury were excluded. Patients were randomly selected from the stroke list provided by the Health and Vital Statistics Division in the Ministry of Health.

Sample Size

The sample size of 984 stroke patients was considered large enough to estimate a prevalence of any risk factor. Under the null hypothesis, we assumed 3% prevalence of such risk factor in the population of stroke patients, significance level (α) of .05, and 90% power to detect the hypothesized difference of 2%. To accommodate missing information on risk factors of interest in patients' files, we inflated the final sample to 1257 stroke patients.

Data Collection

Data were collected using patient's hospital records. The survey consisted of 27 questions, which were divided into 5 major parts. The first part comprised 6 questions about sociodemographic data, the hospital in which the records were obtained, as well as the date of admission.

The second part involved 15 questions about stroke risk factors, previous history of stroke, and history of TIA, defined as an acute neurologic deficit of vascular origin lasting less than 24 hours.[7] History of cardiac disease includes ischemic heart disease, arrhythmias, valvular heart disease, cardiomyopathy, congenital heart disease, and history of atrial fibrillation. Furthermore, a history of migraine, sickle cell anemia, smoking status, use of drugs (cocaine, amphetamines, and heroin), alcohol consumption, and oral contraception were all considered as stroke risk factors. Other risk factors that were assessed include hypertension (currently on antihypertensive treatment or blood pressure readings of 140/90 mm Hg during the period of hospitalization), diabetes mellitus (on treatment with either oral hypoglycemic or insulin before the insult, or by having fasting plasma glucose of more than 7.0 mmol/L, A1C = 6.5% or more, or a casual plasma glucose = 11.1 mmol/L or more), and dyslipidemia (currently on treatment or having a low-density lipoprotein cholesterol more than 200 mg/Dl).[8]

A family history of a stroke in a first-degree relative before the age of 70 was also considered.[9]

The third part was about the subtypes of stroke, which were defined according to the TOAST (Trial of Org 10172 in Acute Stroke Treatment) criteria.[10] The subtypes included cardioembolic ischemic stroke, large-artery atherosclerosis, and small-artery stroke. The type of stroke was obtained through imaging either by brain computed tomography scan or brain magnetic resonance imaging. The diagnosis of atherosclerosis was based on evidence of atherosclerosis in Doppler ultrasonography of carotid and the presence of risk factors (long-term diabetes, hypertension, and smoking).[11]

The fourth part surveyed the treatment, which included both acute (thrombolysis) and secondary prevention of ischemic stroke (antiplatelets, anticoagulants, and carotid endarterectomy). The last part assessed the severity at onset and the neurological outcomes at discharge, and at 1 and 6 months post stroke. The severity was based on modified Rankin Scale, in which grade 1 refers to no deficit, and grade II, grade III, and grades IV and V are equivalent to our mild, moderate, and severe categories, respectively.[12] The outcome was classified as recovered, improved, no improvement, and death, which were ascertained at discharge, in 1 and 6 months duration. The degree of improvement or lack of it was correlated by comparing the power at the onset to that of the outcome at discharge, and after 1 and 6 months.[12] Death certificates were additionally examined for the etiology of mortality.

Statistical Analysis

Statistical program SPSS version 23.0 (IBM SPSS Statistics 23, IBM Corporation, Armonk, NY, 2014) was used to analyze the data. Categorical variables are presented