PATTERN AND RISK FACTORS OF NON-FATAL STROKE IN LIBYAN PATIENTS WITH AND WITHOUT DIABETES

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ABSTRACT

INTRODUCTION: Diabetes mellitus (DM) is recognized as an important risk factor for stroke and might theoretically influence post-stroke level of disability, increasing the extension of the cerebral injured area. Diabetes mellitus (DM) is known to increase the risk of ischemic stroke by two- to four-fold**.**

AIM OF THE STUDY: The main purpose of this study was to evaluate the clinical features of stroke, risk factors for stroke, and stroke subtype after stroke in Libyan patients with diabetes mellitus.

PATIENTS AND METHODS: A retrospective review of clinical records from consecutive patients hospitalized for stroke between 1st of January 2009 and 31st of Dec. 2009 in 7th oct hospital in Benghazi.

RESULTS: During the period of study 244 patients with stroke were admitted, of home 204 (83.6%) survived the in-hospital course. Of the 204 patients with non-fatal stroke, 99 (48.5%) were diabetic. Males constitute 44.6% of the patients.

Ischemic stroke accounted for 81.4% of strokes while 18.6% were hemorrhagic strokes. Of all strokes, 85.3% occurred in patients older than 50 years. In those with diabetes about half of strokes (51.6%) occurred in those with diabetes duration of less than 10 years. Frequencies of other risk factors were as follow: hypertension (72.1%). Smoking (30.4%), previous stroke or TIA (45.6%), atrial fibrillation (5.4%) and treatment with anti-coagulants (4.4%).

Motor deficit was present in all patients, with severe deficit (power of 2/5 or less) detected in 25% of patients. Sensory deficit was recorded in 52.9% of patients , and impaired consciousness in 10.8%.

Partial improvement of moto deficit during hospitalization occurred in 48% of patients, while complete recovery occurred in 7.4%.

There was no statistically significant difference in type of stroke, distribution of risk factors, severity of weakness and in-hospital functional outcome in patients with and without diabetes. However those with diabetes are more likely to have history of other atherosclerotic cardiovascular diseases including previous stroke/TIA than those without diabetes (31.3% vs. 19%, p=0.043) and coronary artery disease (42.4% vs. 21.9, p=0.002).

CONCLUSION: Stroke mortality in our setting is slightly higher than that reported in the developed world. A significant proportion of surviving patients have persistent disability at hospital discharge which may be due to the lack of protocols for reperfusion therapy. Patients with diabetes constitutes about half of acute stroke cases. Although there was no difference in non-fatal stroke characteristics between those with and without diabetes, patients with diabetes are more likely to have previous stroke/TIA or co-existing coronary artery disease which highlights the importance of both primary and secondary preventive measures in these patients.

INTRODUCTION

Diabetes mellitus (DM) is recognized as an important and independent risk factor for cardiovascular disease including stroke (1).

Stroke is considered one of the major macrovascular complications encountered in people with diabetes with significant morbidity and mortality (2). There is also evidence of involvement of cerebral microvasculature adding to the risk of brain injury and dysfunction in people with diabetes (3,4).

The mechanism is believed to be accelerated atherosclerosis, which can affect vessels in many distributions, including small and large vessels. Cardiac involvement may predispose to embolic strokes as well. In addition, patients with diabetes may have any of several lipid abnormalities. Elevated levels of triglycerides, low-density lipoproteins (LDL), and very low-density lipoproteins (VLDL), along with lower than normal levels of high-density lipoprotein (HDL), are common findings in the lipid profiles of patients with diabetes. The combined effect of these factors results in promotion of atherosclerosis and thrombosis (5).

Diabetes does not only increase the risk of stroke but might also influence post-stroke level of disability, increasing the extension of the cerebral injured area (6).

Although most of clinical studies suggest that hyperglycemia is associated with poor clinical outcome in acute stroke patients, there are still many theoretical and practical doubts that are reflected in some differences in treatment recommendations from clinical guidelines developed in Europe (European Stroke Initiative, Croatian Association for Neurovascular Disorders) and in the USA(American Stroke Association)(7-9).

Although more than 80% of patients survive acute stroke, the do so with variable degree of disability and independency with continuing risk of different post-stroke complications (10). Therefore, nonfatal stroke remains a significant and challenging healthcare problem both in people with and without diabetes. The main purpose of this study was to evaluate the clinical features of stroke, risk factors for stroke, and stroke subtype after stroke in Libyan patients with diabetes mellitus.

PATIENTS AND METHODS

A retrospective study in which clinical records from consecutive patients hospitalized for stroke between 1st of January 2008 and 31st of December 2009 in the 7th of October hospital in Benghazi were reviewed. Data on risk factors for stroke , including age, sex, ,smoking, previous transient ischaemic attack, hypertension, diabetes mellitus and congestive heart failure, were recorded. The functional outcome of nonfatal stroke was categorized into: complete improvement, partial improvement, and no improvement.

Patients were defined as diabetic if they had known diabetes mellitus before the stroke according to the diagnostic criteria of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (fasting glucose level 126 mg/dL or plasma glucose level 200 mg/dL after glucose ingestion) (11). Patients with stress hyperglycemia on admission were not defined as diabetic. Strokes were classified as Ischemic, or hemorrhagic basis of brain imaging results.

Differences in frequencies of risk factors, type of stroke, initial presentation and functional outcome between those with and without diabetes were analyzed.

Data were analyzed using the SPSS Statistics (SPSS Inc., Chicago, US) version 17.0. Discrete variables were expressed as numbers and percentages, and continuous variables as the mean and standard deviation (SD).

Differences between categorical values were analyzed using the chi-square test while the Student's *t*-test was used for continuous values. A *p*-value less than 0.050 was considered statistically significant.

RESULTS

During the period of study 244 patients with stroke were admitted, of home 204 (83.6%) survived the in-hospital course. Of the 204 patients with non-fatal stroke, 99 (48.5%) were diabetic. Males constitute 44.6% of the patients.

Of all strokes, 85.3% occurred in patients older than 50 years. In those with diabetes about half of strokes (51.6%) occurred in those with diabetes duration of less than 10 years. Frequencies of other risk factors were as follow: hypertension (72.1%). Smoking (30.4%), previous stroke or TIA (45.6%), atrial fibrillation (5.4%) and treatment with anti-coagulants (4.4%). Table 1 shows the background demographic and background characteristics of study patients.

Table 1: Background characteristics of patients with nonfatal stroke

	All (n=204)	Diabetes (n=99)	No diabetes (n=105)	P value
Age		Mean 67.5 ±9.9 years. Range (45-90 years)	Mean 65.1±14.9 years. Range (17- 95years)	P = 0.192
Sex Males Females	 91(44.6%) 113 (55.4%)	 39 (42.9%) 60 (53.1%)	 52 (57.1%) 53 (46.9%)	p = 0.146
Hypertension	147 (72.1)	72(72.7%)	75(71.4%)	p = 0.836
Smoking	62(30.4%)	27(27.3%)	35(33.3%)	p = 0.347
Previous stroke or TIA	93(45.6%)	54(54.5%)	39(37.1%)	p = 0.010
Atrial fibrillation	11(5.4%)	55.1%)	6(5.7%)	p = 0.834
Treatment with anti-coagulants	9(4.4%)	5(5.1%)	4(3.8%)	P=0.729
Treatment with Aspirin	185(90.7%)	94(94.9%)	91(86.7)	p = 0.042
IHD	65 (31.9%)	42 (42.4%)	23 (21.9%)	p = 0.002

Ischemic stroke accounted for 81.4% of strokes while 18.6% were hemorrhagic strokes.

Motor deficit was present in all patients, with severe deficit (power of 2/5 or less) detected in 25% of patients. Sensory deficit was recorded in 52.9% of patients , and impaired consciousness in 10.8%.

Table 2 shows the clinical presentation of the study patients.

Table 2 Clinical presentation of the study patients

	All (n=204)	Diabetes (n=99)	No diabetes (n=105)	P value
type of stroke Ischemic Hemorrhagic	 166 (81.4%) 38 (18.6%)	 82 (82.8%) 17 (17.2%)	 84 (80%) 21 (20%)	p = 0.604
Severity of weakness	57 (27.9%)	24(24.2%)	27 (13.2%)	p = 0.308
Sensory deficit	108 (52.9%)	56 (56.6%)	52 (49.5%)	p = 0.449
Decrease consciousness	22 (10.8%)	9 (9.1%)	13 (12.4%)	p =0.449

Partial improvement of moto deficit during hospitalization occurred in 48% of patients, while complete recovery occurred in 7.4%.

Table 3 shows the functional outcome of the study patients.

Table 3: functional outcome of the study patients.

Outcome of stroke	Diabetes				Total	
	Yes		No		No.	%
	No.	%	No.	%		
Partial improvement	48	48.5	50	47.6	98	48
Complete improvement	5	5	10	9.5	15	7.4
No change	46	46.5	45	42.9	91	44.6
Total	99	100	105	100	204	100

p = 0.462

There was no statistically significant difference in type of stroke, distribution of risk factors, severity of weakness and in-hospital functional outcome in patients with and without diabetes. (see tables 1-3)

However those with diabetes are more likely to have history of other atherosclerotic cardiovascular diseases including previous stroke/TIA than those without diabetes (31.3% vs. 19%, p=0.043) and coronary artery disease (42.4% vs. 21.9, p=0.002). (see tables 1-3).

DISCUSSION

Worldwide the average in-hospital mortality due to stroke is estimated to be around 8 to 14% (10).

In our setting, the mortality rate was slightly higher (16.4%) than that reported from developed countries (10,12). Still the majority of patients with acute stroke survive the acute event, highlighting the importance of caring for nonfatal stroke. There was no difference in the mortality rate between those with and without diabetes in our study. However, several studies have reported increased mortality from stroke in the diabetic patients (13,14). Furthermore, different studies have also demonstrated that stroke patients with diabetes have higher in-hospital mortality rates and worse outcome than those without diabetes (15,16).

It is worth mentioning that the lack of difference in our mortality rate is probably due to the relatively smaller study sample and the fact that it is from a single center. In studies where there was differences in mortality between those with and without diabetes, the sample populations usually exceed 1000 patients and are from multiple centers (13-18).

In our study there was no difference in the severity of neurological deficit at presentation and in functional outcome at discharge between those with and without diabetes (tables 2 and 3) . This finding agrees with different results from previous studies.

In a study of Lausanne Stroke Registry which includes more than 4000 patients with stroke (15% of them were diabetic) the Initial stroke severity and functional outcome were not significantly different between patients with and without diabetes (17).

In the The Copenhagen Stroke Study, a community-based stroke study of 1135 stroke patients (20% of them are diabetic) the presentation severity and the outcome of nonfatal stroke were comparable between those with and without diabetes although patients with diabetes recovered more slowly (18).

Previous studies showed that there is no difference in the prevalence of ischemic stroke between patients with diabetes and those without diabetes but the frequency of hemorrhagic stroke was lower among those with diabetes (17-20). In our study, the frequency of hemorrhagic stroke was slightly lower among diabetics (17.2% vs. 20%) but this was not statistically significant.

The distribution of other risk factors (age, gender, hypertension, smoking, atrial fibrillation, anticoagulant therapy) was comparable between nonfatal stroke patients with diabetes and no diabetes in our study (table 1). In other studies, the prevalence of these risk factors among those with and without diabetes was variable with some showing no difference and others showing higher prevalence of some of these risk factors among patients with diabetes (21-24).

The most consistent finding was that the prevalence of previous TIA, stroke and coronart artery disease (CAD) was higher among nonfatal stroke patients with diabetes compared to those without diabetes (21-24). This finding was also observed in our study where patients with nonfatal stroke and diabetes are more likely to have history of TIA, previous stroke or CAD than those without diabetes (table 1).

The most notable finding in our study is that the functional outcome of nonfatal stroke is unfavorable both in patients with diabetes and without diabetes with complete recovery observed in only 5% and 9.5% respectively. Furthermore, the presence of severe weakness causing disability is seen in about 25% of patients with diabetes. This is in contrast to lower frequency of disability seen at discharge in other studies like The Copenhagen Stroke Study, which is estimated to be 14.1% in diabetics 15.3% in nondiabetic (18). The lack of significant functional improvement in our study is most likely due to the lack of administration of thrombolytic therapy with tissue plasminogen activator (tPA) in patients with acute ischemic stroke. Although different studies yielded conflicting results on the effects of the thrombolytic therapy on stroke mortality, there was consistent agreement among them that this therapy results in significant functional improvement at with almost 50% of patients ended with no or minimal disability at discharge (25). The rate of functional recovery of nonfatal stroke in our study could have been better if thrombolytic therapy is employed with a dedicated acute stroke service.

In conclusion, the in-hospital stroke mortality in our setting is slightly higher than that reported in the developed world. A significant proportion of surviving patients have persistent disability at hospital discharge which may be due to the lack of protocols for reperfusion therapy. Patients with diabetes constitutes about half of acute stroke cases. Although there was no difference in non-fatal stroke characteristics between those with and without diabetes, patients with diabetes are more likely to have previous stroke/TIA or co-existing coronary artery disease which highlights the importance of both primary and secondary preventive measures in these patients.

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