

# Characterization of Hospitalized Ischemic Stroke Patients in Palestine

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## Abstract:

**Objective:** Stroke is a major health problem, yet no studies on stroke have been reported from Palestine. This one-year, hospital-based study was conducted to determine the prevalence of risk factors and the in-hospital mortality rate in patients with ischemic stroke. **Method:** All patients admitted to Al-Watani government hospital and diagnosed with ischemic stroke between September 2006 and August 2007 were included in the study. Data were obtained by retrospective review of medical charts. Pearson Chi-square and independent t test were used in the univariate analysis. Multiple logistic regression analysis was used to determine the independent predictors of in-hospital mortality rates among the patients. Statistical testing and graphics were carried out using SPSS 15. **Results:** We identified 153 ischemic stroke patients (83 females and 70 males) of whom 92 were having a first-ever stroke (FES). Patients had several prevalent modifiable risk factors such as hypertension (HTN) (66%), diabetes mellitus (DM) (45.8%), and renal reduced renal function (crcl < 60 ml/ min) (33.9%). Twenty-six (17%) of the patients died during hospitalization. Four variables were significantly associated with in-hospital mortality: history of previous stroke (P= 0.004), crcl at admission (P=0.004), number of post-stroke complications (P=0.001), and age (P=0.043). Multiple logistic regression analysis indicated that the number of post-stroke complications (P= 0.001) and previous stroke (P=0.03) were significant independent predictors of in-hospital mortality. **Conclusion:** Screening and better control of risk factors, especially HTN, DM and renal dysfunction, are required to decrease the incidence and in-hospital mortality among patients with ischemic stroke.

**Key words:** *Ischemic stroke, Risk factors, In-hospital mortality, Palestine*

## Introduction

Studies have demonstrated that different ethnic groups may have different predisposing risk factors, epidemiologic patterns, and outcomes of stroke. This has been shown in African Americans, Caucasians, Hispanics, Arabs, and Asians [1-6]. These differences could be due to differences in demographic or socioeconomic factors or in lifestyle. Although epidemiologic studies on stroke were carried out in different parts of the world, including some Arab countries [7-11], there are no published data about Palestine. Data on stroke epidemiology are important for diagnostic, therapeutic and preventive purposes. Furthermore, knowledge of the prevalence of stroke-related risk factors can help health decision makers to direct efforts toward reducing stroke-related morbidity and mortality.

In Palestine, the Ministry of Health is the major provider of medical services. The private sector plays a minor role due to its high cost compared to the average income in Palestine. Currently, the Palestinian National Authority is in charge of West-bank and Gaza strip, with a total population of 4,151,668 inhabitants. The West Bank is divided into 10 districts. Nablus district is the second largest district with a population of 362,159 native Palestinian inhabitants. This study was conducted to identify the risk factors, in-hospital mortality, and discharge medications for patients with ischemic stroke admitted to Al-Watani government hospital, Nablus, Palestine.

## Methods and patients

This one-year, retrospective, hospital-based study was conducted between September 01, 2006 and August 31, 2007. All patients admitted to the hospital with acute ischemic stroke were included in the study. Diagnosis of ischemic stroke had been confirmed by computerized tomography (CT) scan. Each diagnosed patient had been followed up until either death at the hospital or discharge.

Data collection was approved by the health authorities at the hospital.

The data were collected by retrospective review of medical charts included age, gender, medications, serum creatinine (scr) level, risk factors, and post-stroke medical complications. Then following were considered risk factors: age, hypertension (HTN), diabetes mellitus (DM), congestive heart failure (CHF), atrial fibrillation (AF), ischemic heart disease (IHD), smoking, previous stroke, and obesity [12-15]. Hyperlipidemia is a risk factor for stroke, but we did not include it because it had not been done routinely at the hospital. Obesity was defined as a body mass index (BMI) >30 for both genders. Creatinine clearance (crcl) was calculated by using Cockcroft-Gault equations, and values for females were obtained by multiplying the result by 0.85. The number of post-stroke complications was counted for each patient. The post-stroke complications considered were the presence of one or more of the following: constipation, seizure, depression, infection, limb pain, and gastrointestinal upset.

## Statistical analysis

Analysis of data was carried out using the "Statistical Package for Social Sciences" (SPSS) program for Windows version 15.0 (SPSS Inc., Chicago, IL). Univariate analysis was carried out using Pearson Chi-square for categorical variables and student's t test for continuous variables. P <0.05 was used as a significance level. Multiple logistic regression analysis was used to find independent predictors of in-hospital mortality. Variables included in the regression model were those that had a significant P value (P<0.05) in the univariate analysis.

## Results

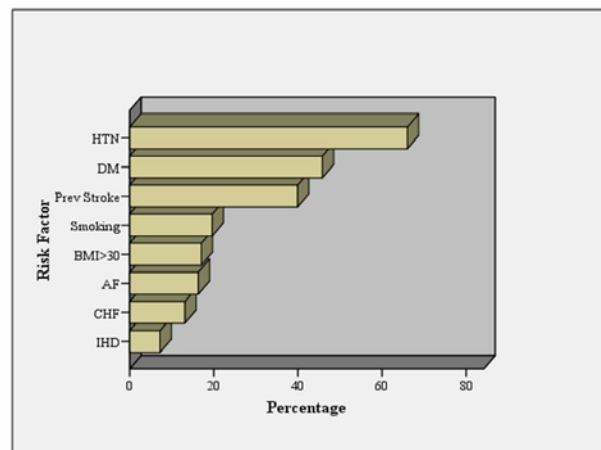
We found that 186 stroke patients were admitted to the hospital during the study period; of these, we studied 153 who were diagnosed with ischemic stroke. All patients were admitted within 48 hours of the attack. The average age of the patients was 69.08± 11.15 years (range 41-

90). Less than 2% of the patients were < 45 years old. 45.8% were males and 54.2% were females, giving a male:female ratio of 0.84:1. There was no significant difference between females and males in age. Among the patients, 39.9% had previous attack, and 60.1% had a first ever stroke (FES). Patients with FES were younger than those with recurrent stroke ( $67.94 \pm 11.66$  versus  $70.80 \pm 10.19$  years, respectively); the difference in age between the two groups was not significant ( $P = 0.11$ ).

The prevalence of risk factors in the study sample was investigated (Figure 1). Patients had an average of  $3.4 \pm 1.2$  risk factors (range 1 – 7) before the attack. HTN was the most prevalent risk factor (66%) of the patients, followed by DM (45.8%). Renal dysfunction was also common: 33.9% of the patients had an estimated  $\text{crcl} < 60$  ml/min. Smoking was practiced by 19.6% of the patients, most of whom (99%) were males. AF was found in 16.3% of patients. No significant difference was found in the prevalence of risk factors between males and females, with the exception of smoking which was significantly associated with males. However, CHF and DM were more common in females, while HTN was more common in males.

Twenty-six (17%) of the patients died during hospitalization. Of the 127 survivors, three left the hospital against medical advice and 124 continued treatment until discharge. Four variables were significantly associated with in-hospital mortality: history of previous stroke ( $P=0.004$ ),  $\text{crcl}$  at admission ( $P=0.004$ ), number of post-stroke complications ( $P=0.001$ ), and age ( $P=0.043$ ). Gender, HTN and DM were insignificantly associated with mortality. Multiple logistic regression analysis indicated that the number of post-stroke complications ( $P=0.001$ ) and previous stroke ( $P=0.03$ ) were significant independent predictors of in-hospital mortality. Table 1 summarizes the demographic and clinical characteristics of patients who survived versus those who died. Table 2 shows multiple logistic regression model using the enter method for predicting mortality after stroke.

Medications prescribed for stroke survivors at discharge were analyzed. An average of 4.33 medications ( $SD = 1.5$ , range: 1 - 9) were prescribed per stroke survivor. The medications prescribed were from six different therapeutic drug classes. Seventy-four (92.5%) stroke survivors with a diagnosis of hypertension were discharged on antihypertensive medications. ACE-I were the most ( $n = 62$ , 50%) was the class of antihypertensive agents most frequently prescribed for stroke survivors. Medications prescribed at discharge were similar to those given at admission. The main exceptions were anti-coagulants, antibiotics, and anti-inflammatory agents, all of which were used at admission but were discontinued at discharge. Most patients (98%) were discharged with anti-platelets. There was no difference in the average number of medications prescribed for males and females at discharge ( $P=0.36$ ).



**Figure 1** Prevalence of various risk factors in the stroke patients admitted to the hospital during the study period. HTN: hypertension, DM: diabetes mellitus, BMI: body mass index, AF: atrial fibrillation, CHF: congestive heart failure, IHD: ischemic heart disease

**Table 1** Results of univariate analysis of 153 ischemic stroke patients according to vital status at discharge.

Variable	Died N=26	Survived N= 127	P value
Age	73.11 ± 11.19	68.26 ± 11.01	0.043*
Creatinine clearance	61.63 ± 41.97	90.64 ± 50.79	0.004*
Post-stroke complication	1.73 ± 1.15	0.86 ± 0.92	0.001*
Gender (Male/Female)	14 (53.8%) 12 (42.6%)	56 (44.1%) 71 (55.9%)	0.36
HTN	19 (73.1%)	82 (64.6%)	0.40
DM	15 (57.9%)	55 (43.3%)	0.18
Previous stroke	17 (65.4%)	44 (34.6%)	0.004
Previous Anti-platelet	19 (73.1%)	74 (58.3%)	0.159
AF	4 (15.4%)	21 (16.5%)	0.885
Smoking	7 (26.9%)	23 (18.1%)	0.302
IHD	3 (11.5%)	8 (6.3%)	0.346
CHF	3 (11.5%)	17 (13.4%)	0.799
Obesity	12 (46.1%)	46 (36.2%)	0.263

HTN: hypertension, DM: diabetes mellitus, AF: Atrial fibrillation, IHD: ischemic heart disease, CHF: congestive heart failure. Continuous variables were expressed as mean ± SD, while categorical variables were expressed as frequency and percentage. P value was calculated using independent t test for continuous variables and Chi-square test for categorical variables.

**Table 2** Multiple logistic regression by the enter method for identifying predictors of mortality after ischemic stroke.

Variable	Beta	St. error	P value	95% CI
Age	.001	0.003	0.677	[-0.005 – 0.007]
Creatinine clearance	-0.001	0.001	0.148	[-0.002 – 0.000]
No. of complications	.099	0.029	0.001	[0.041 – 0.156]
Previous stroke	.131	0.060	0.032	[0.012 – 0.250]

### Discussion

We studied the characteristics of patients with ischemic stroke attacks at Al-watani hospital, Palestine. The mean age was higher than that reported in hospital-based studies from some other Arab countries but lower than

that reported from developed countries [16,17]. An important observation is the very low percentage (1.6%) of stroke patients who were less than 45 years old. The prevalence of stroke in young patients seems to vary between different ethnic groups of various geographical areas. For instance, only 3–5% of all strokes occurred in individuals under 45 years old in some countries, while in others they constituted as much as 19–30% [18-20]. The male:female (M:F) ratio of 0.84:1 in this study was not in agreement with previous studies on stroke from other countries. One study in a province of Saudi Arabia found a M:F ratio of 1.8:1. A second study among the National Guard community in Saudi Arabia found a M:F ratio of 2.2:1. A third study in Saudi Arabia found a ratio of 3.4:1 [21-23]. However, a hospital-based study in Saudi Arabia found a 1:1 male: female ratio in stroke patients in general [24]. The unexpected gender ratio in our study might indicate the presence of undiagnosed or uncontrolled stroke-related risk factors in women in Palestine.

The high prevalence of risk factors among the stroke victims indicates that control of these factors is important for the prevention of stroke. Thus, screening, modification, and better control of existing risk factors, such as HTN, DM, and cardiac diseases, should be the primary strategy for prevention of stroke. Prospective observational studies have established that the risk of primary stroke is strongly related to blood pressure (BP) [25]. Lowering diastolic BP by 5 mmHg or systolic BP by 10 mmHg reduces the risk of stroke by an estimated 38% [26]. In our study, most patients with HTN were given anti-hypertensive agents, particularly ACE-I, at discharge. About one-third of the patients had an estimated  $\text{crcl} < 60 \text{ ml/min}$ . A recent study indicated that mild degrees of renal dysfunction are associated with increased risk of incident ischemic stroke or transient ischemic attack [27]. Recent studies have also established that patients with end stage renal disease (ESRD) have 5–10-fold higher risk of stroke compared to patients with non-ESRD [28,29].

Results of in-hospital mortality among stroke patients in this study were also close to those reported in most Arab countries. Four variables were significant risk factors of in-hospital mortality in stroke patients, namely, history of previous stroke, number of post-stroke complications, creatinine clearance, and age. The influence of age on stroke outcome is still a matter of debate. While several studies showed a negative influence, other studies showed no influence [30-38]; our results resemble those that showed a negative influence of age on stroke outcome. It is difficult to establish whether age influences stroke outcome itself, or through other factors associated with age. Our finding regarding  $\text{crcl}$  as an independent predictor of early mortality in stroke patients is endorsed by some studies. For example, a study by Friedman in 1991 indicated that serum creatinine was an independent predictor of mortality among 492 stroke survivors followed up for a mean period of 18 months [39]. Another 7-year follow up study carried out by MacWalter et al. in 2002 indicated that patients with creatinine clearance calculated at admission of  $< 51 \text{ ml/min}$  had a higher mortality rate [40]. Finally, a recent study by Fabjan et al. indicated that in patients with ischemic stroke, decreased  $\text{crcl}$  was associated with higher in-hospital mortality [41].

Interestingly, we found that prior use of anti-platelets was not associated with decreased risk of mortality. A hospital-based study carried out in Kuwait found that non-use of anti-platelets is significantly associated with deleterious 30-day outcome [42]. One way to reduce early mortality in stroke patients is to develop a stroke unit supervised by a specialized neurologist. Admission of acute stroke patients into specialized hospitals seems to reduce the risk of in-hospital mortality [43]. Moreover, academic medical centers with vascular neurologists had lower rates of in-hospital mortality for patients with ischemic stroke [44]. It seems that mortality in patients with stroke does not depend only on patient-related factors but also on hospital characteristics.

## Conclusion

Most of the patients in the study had risk factors commonly present in stroke patients. Better control of these risk factors might decrease the future incidence rate of stroke in Palestine. The number of post-stroke complications and previous stroke were significant independent predictors of in-hospital mortality. Medications prescribed at discharge for stroke survivors are consistent with the type of risk factors, especially HTN, present in patient's medical files.

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