

ORIGINAL ARTICLE

PREDICTORS OF MORTALITY AFTER ACUTE STROKE A PROSPECTIVE HOSPITAL BASED STUDY

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Background: The stroke is third leading cause of death in world and 10% of patients with an acute ischemic stroke die within 30 days. Various clinical variables have been implicated as predictors of final outcome of acute stroke. The study was aimed to identify predictors of mortality after an acute stroke. **Material and Methods:** This prospective study included 149 consecutive patients of acute Hospital Muzaffarabad, Azad Kashmir. The outcome as mortality measures used were Modified Ranking Scale (mRS) and Glasgow Coma Scale (GCS). Examination included clinical, neurological evaluation, laboratory tests, and brain CT. The follow-ups at 14 days were done for all patients. **Results:** Hospital mortality was 17.4 % (26/149) within 14 days. Age and gender had no impact on mortality. Hypertension ($p=0.008$), smoking ($p=0.056$), brain infarction ($p<0.001$), hemorrhagic stroke ($p<0.001$), diabetes ($p=0.292$), atrial fibrillation ($p<0.001$), high mRS ($p<0.001$), low GCS score ($p<0.001$), on admission were important predictors of mortality. **Conclusions:** We report 17.4% mortality at 14 days. Mortality associated with acute stroke needs prevention and control of risk factors. **Keywords:** acute stroke; predictors; mortality, Glasgow Coma Scale, Modified Ranking Scale

INTRODUCTION

The stroke is third leading cause of death in world and 10% of patients with an acute ischemic stroke die within 30 days.^{1,2,3} It has major impact on mortality morbidity and socio economic cost.⁴ Various clinical variables have been implicated as predictors of final outcome of acute stroke. These predictors are demographic, types of stroke localisation of brain lesions, comorbidities and therapy.⁵ The identification of mortality predictors is of importance for specific therapies.^{6,7} The Barthel index, has been used as prognostic indicators stroke.⁸ The mRS and GCS has been used in previous studies for functional disability ranking and mortality outcome measures.^{3,8,9}

MATERIAL AND METHODS

The patients who presented within 24 hours after symptom onset to our hospital with a first-ever acute stroke were prospectively included from 1st January 2011 to 31st December 2011. The WHO definition of stroke was used to define stroke.¹⁰ The ethics committee approved this study. The stroke was diagnosed when neurological deficits were confirmed on CT scan brain in every patient. Patients with transient ischemic attack (TIAs) and subarachnoid haemorrhage (SAH) were excluded. A 12-lead ECG and echocardiography were done. Stroke severity on admission was assessed with mRS⁸ and GCS. The history of pre-existing stroke risk factors was assessed. The hypertension was defined as history of hypertension or antihypertensive treatment or had two measurement of blood pressure BP >160/95 mmHg or single measurement of BP >180/110 mmHg during admission.^{11,12} Diabetes mellitus was defined as by preadmission history of diabetes mellitus and its

drugs or venous plasma glucose concentration of 7.0 mmol/L after an overnight fast on at least two separate measurement and or 11.1 mmol/L two hour post prandially¹³, current cigarette smoking was defined as who smoked at least one cigarette/tobacco per day for preceding three months or more⁹. Hypercholesterolemia defined as by preadmission history with cholesterol >5 mmol/L, and LDL-cholesterol >3 mmol/L¹³ and history of coronary artery disease. The cause of death due to stroke declared unless another cause of death was found.

Glasgow Coma Scale (GCS) and modified Rankin Scale (mRS) score were used as a measure of level consciousness, disability during admission and discharge.^{8,9} The data entry and analyses were done on software statistical package SPSS-20. Chi-square test both parametric and nonparametric done where appropriate for those in proportion. Quantitative data was expressed as mean and standard deviation. Mortality was cross-tabulated as dependent variable to risk factors of stroke as independent variables to get p value. Data was reported in frequency tables. Differences between groups and the effect of patient characteristics on clinical outcome were assessed using the Fisher Exact test for comparison of proportions.

RESULTS

During the 1st January 2011 to 31st December 2011, 49 patients (Mean age 64.78±9.404 Years, range 45–85 Year) were admitted to our hospital with a first-ever acute stroke. There were 77 men and 72 women (57.7% vs. 47.3%) (Table-1). The maximum frequency of stroke was seen between ages 55–74. Mean systolic blood pressure was 167±27.24 and mean diastolic blood pressure 101±17.4. Glasgow Coma Scale (GCS) was

between 13/15 to 15/15, 9/15 to 12/15 and 58 (38.9%) between 1/15 to 8/15 on admission. Out of 149 stroke patients 112 (75.1%) had brain infarctions and 37 (24.8%) were having hemorrhagic stroke.

Table 2 shows the characteristics of the 149 patients with acute stroke. Hypertension was the most common risk factor 113 (75.8%) followed by hypercholesterolemia 104 (69.8%), smoking 85 (57%) coronary artery disease 67 (44.9%) diabetes mellitus 24 (16.1%) and atrial fibrillation 15 cases (12%).

The mean fasting blood sugar was 6.50±2.42 mmol/L and mean random blood sugar was 10.80±8.2 mmol/L. Mean cholesterol was 6.39±3.8 mmol/L.

Out of 149 patients with acute stroke 26 (17.4%) died. Out of them 16 (22.2%) were female and 10 (13%) were male. Mortality was common in age 55–74 years. No significant association of mortality observed between age and gender (Table-1). GCS score <1–8 revealed more mortality as compared to patient having GCS>9. Hemorrhagic stroke showed high mortality 15 (10.2%) as compared to ischemic stroke 11 (7.4%). Both have significant association with mortality. Clustering of risk factors along with comorbidities influenced the hospitals mortality (Table-2).

The mRS score depicting functional disability as well mortality prognosticator predictors of outcome worst with high as compared to lowest score (mRS 6 vs mRS 1–5) (Table-3). In our analysis hypertension ($p=0.013$), high mRS score ($p<0.001$), low GCS score ($p<0.001$), (haemorrhagic stroke (<0.001)) brain infarctions ($p<0.001$), atrial fibrillation ($p<0.001$), on admission were associated with high mortality.

Table-1: Mortality according to gender and age

Variables	Total		Mortality	Alive	p
	No. (%)	No. (%)	No. (%)	No. (%)	
Gender	Male	77 (52.7)	10 (13.0)	67 (87.0)	0.102
	Female	72 (47.3)	16 (22.2)	56 (77.8)	
Age (Year)	45–54	25 (16.8)	7 (28)	18 (72)	0.508
	55–64	42 (28.2)	5 (11.9)	37 (88.1)	
	65–74	53 (35.6)	10 (18.9)	43 (81.1)	
	75–84	28 (18.8)	3 (10.71)	25 (89.2)	
	>85	1 (0.67)	1 (0)	0 (0)	

Table-2: Mortality according to GCS, stroke type and factors

Variables	Total		Mortality	Alive	p
	No. (%)	No. (%)	No. (%)	No. (%)	
GCS	1–8	58 (38.9)	23 (15.8)	35 (24.0)	0.001
	9–12	65 (43.6)	2 (1.4)	63 (43.2)	
	13–15	26 (17.4)	1 (7)	25 (16.7)	
Risk Factors	Hypertension	113 (75.8)	20 (13.7)	93 (63.7)	0.008
	Hypercholesterolemia	104 (69.8)	21 (15.6)	83 (61.5)	0.139
	Smoking	85 (57.0)	11 (7.5)	74 (50.7)	0.056
	Cardiac disease	67 (44.9)	10 (6.8)	57 (38.5)	0.292
	Diabetes	24 (16.1)	6 (4.0)	18 (12.1)	0.215
Stroke	Cerebral Infarction	112 (75.1)	11 (7.4)	101 (67.78)	<0.001
Sub-type	Cerebral Haemorrhage	37 (24.8)	15 (10.2)	22 (15.0)	<0.001

Table-3: Mortality and outcome of acute stroke according to modified ranking scale score

mRS Scale Score	Variables	Total	Mortality	Alive	p
		No. (%)	No. (%)	No. (%)	
0	No symptoms	2 (1.3)	0 (0)	2 (1.3)	<0.001
1	Adl ability	6 (4.0)	0 (0)	6 (4.0)	
2–3	Slight & Moderate activity	18 (12.1)	3 (2)	15 (10.0)	
4	Moderate Severely Activity & Walk with assistance	52 (34.9)	2 (1.3)	50 (33.6)	
5	Severe disability and bedbound	52 (34.9)	2 (1.3)	50 (33.6)	
6	mRS 6		19 (12.8)		
Total		149 (100)	26 (17.4)	123 (82.6)	

DISCUSSION

Out of 149 patients, 17.4% died within 14 days of their first-ever stroke. The stroke subtypes, intracerebral haemorrhage (10.2%), brain infarction (7.4%), lower GCS and high mRS on admission were the only predictors of high mortality. We used GCS score for level of consciousness which is also helpful as prognosticator predictor in mortality in acute stroke.⁹ The mRS score as measure of functional disability and recovery has been used as reliable predictors in early stroke studies.^{8,15} The 30-day mortality in Framingham cohorts study showed 14% mortality in men as compared to female 20%. In our study, we did not observe any significant gender differences in mortality. E0Another study reported 8.2% mortality at 30 days after the stroke.⁵ Others studies reported 10%, 17.2% and 17.8% mortality due to initial acute stroke.^{2,4} In hospital mortality in Pakistan and India reported between 7% to 34%.^{15,16} The hemorrhagic stroke has high mortality of 40–50% in the world.¹⁵ Our study showed 15 (10.2%) patients dying of haemorrhagic stroke ($p=0.001$) and GCS score <9 with or without brain haematoma had worse prognosis ($p=0.001$). The 14-day mortality rate in this study is in the higher in range than reported in the literature. Our findings show higher stroke mortality rate as compared with developed countries.¹⁷ The comparison is not justified, because patients admitted are highly selected. Several factors like comorbidities are known to influence mortality. The Framingham and other studies had shown that advanced age in acute stroke was independently associated with high mortality.¹⁸ Advanced age with diabetes and stroke subtype, was also an independent predictor of 30-day mortality.³ Significance association of mortality had not been observed for age (Table-1) and diabetes mellitus in our 5study. Stroke severity on admission depends on level of consciousness was the main clinical predictor of early mortality in many previous studies.^{19–24} The acute event after stroke carries

immediate risk of death. This fact has also been observed in our study.

This study has limitations as it was carried in tertiary care hospital hence results cannot be generalised for the whole population. Two weeks follow-up is too short period to identify outcome of acute stroke. The size and site of infarct or haemorrhage and interventions were not evaluated as prognosticator.

CONCLUSION

Stroke causes great morbidity and mortality. We reports 17.4% mortality rate at 14 days after acute stroke. We recognized brain haemorrhage, brain infarctions, lowest GCS score, high mRS score, hypertension, smoking, diabetes and ischemic heart disease as bad prognosticator predictors of mortality after acute stroke.

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