

Blood Pressure and its Effect on Clinical Outcome of Stroke

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Stroke is a clinical condition characterized by an abrupt onset of a non-convulsive and focal neurologic deficit. The deficit may remain fixed or may rapidly improve or progressively worsen. It is this abrupt onset of a non-convulsive and focal neurologic deficit that defines a stroke, or cerebrovascular accident (CVA). The study was aimed to find out the relationship between outcome of stroke at discharge and at 30 days and on admission blood pressure status and other important risk factors. The outcome was evaluated by Modified Rankin Scale (MRS). This was a Descriptive and follow up study conducted in the Department of Medicine, Dinajpur Medical College Hospital, Dinajpur during the period of January 2010-December 2010. All adult patients suffered from stroke irrespective of sex who got admitted in Medicine and Neurology Department was included in this study. A total of 100 adult patients of stroke admitted were selected purposively after getting informed consent. The mean (\pm SD) age of the patients was 54.33(\pm 12.9) years with highest number in age group 51-60 years and male-female ratio 48:52. History of hypertension, diabetes, ischaemic heart disease, and transient ischaemic attack were present in 47%, 16%, 7%, and 17% of patients respectively. Habit of smoking, taking tobacco leaf and both of them were present in 27%, 31% and 13% of patients respectively. On admission 68% patients were hypertensive and on CT scan finding 60% patients had infarction and 40% haemorrhage. At discharge mild disability was present in 6% patients and moderate and severe disability was present in 87% patients. 7% patients died. Death and severe disability at discharge was significantly more in female than male participants. Death and disability were present significantly more in patients with infarction than haemorrhage in the CT scan finding of the brain ($p < 0.05$). Death and disability did not differ significantly among the participants with or without TIA, IHD, hypertension, DM age group, and history of taking tobacco. At 30 day follow up death and disability was not associated with gender, different age group, presence of history of using tobacco, hypertension, IHD, DM, and on admission hypertension, type of stroke. The findings of the present study concluded that there barely an association between on admission blood pressure and stroke outcome at discharged ($P > 0.05$) and on 30 day ($P > 0.05$). Also the findings of the present study shows that death and severe disability at discharge was significantly higher in female than male patients ($P < 0.05$). Death and disability were also more prevalent in patients with infarction than hemorrhagic stroke ($P < 0.05$). At 30 day follow up neither risk factors nor type of stroke is associated with outcome of the stroke.

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Introduction

Stroke is a clinical condition characterized by an abrupt onset of a non-convulsive and focal neurologic deficit. The deficit may remain fixed or may rapidly improve or progressively worsen. It is this abrupt onset of a non-convulsive and focal neurologic deficit

that defines a stroke, or cerebrovascular accident (CVA).¹ Disease of the cerebral blood vessels are the third most common cause of death in the developed world after cancer and ischaemic heart disease, and are responsible for a large proportion of physical disability, becoming more frequent with

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increasing age. The annual incidence of acute cerebrovascular diseases in the over 45 years age group in the UK is about 350 per 100,000.² Categories of cerebrovascular diseases include ischemia-infarction and intracranial hemorrhage. Many of the arterial and cardiac disorders underlying these diseases are preventable: the morbidity and mortality from cerebrovascular diseases has been diminishing in recent years, apparently because of better recognition and treatment of hypertension.¹ The risk factors for strokes are high blood pressure, diabetes mellitus, heart disease, high cholesterol, and increasing age. The additional risk factors for hemorrhagic strokes are alcohol use, bleeding disorder and head injury. Among these risk factors high blood pressure is the most important modifiable risk factor.³ Some studies have been carried out to examine the role of risk factors in the outcome of the disease. Barrett et al (2007) found no sex difference in stroke severity, stroke type, or infarct size and location in patients with incident ischemic stroke.⁴ Chronic heart disease (CHD) and diabetes mellitus were each associated with functional outcome among women with ischaemic stroke.⁵ The outcome of stroke patients influenced by previous high blood pressure is not clearly known. The data regarding this issue is also scarce. We designed this study to examine the role of hypertension in the outcome of stroke.

Methods

This was a descriptive and follow up study conducted in the Department of Medicine, Dinajpur Medical College Hospital, Dinajpur during the period of January 2010 to December 2010. All adult patients suffered from stroke irrespective of sex who got admitted in Medicine and Neurology Department was included in this study. The exclusion criteria was 1) age below 19 and over 80 (WHO defines children up to age 19), 2) patient failed to admit within 24 hours of

stroke onset, 3) CT scan could not confirm stroke (other pathology like tumor/SOL other than acute haematoma), 4) metabolic/inflammatory/infective disorder that can explain focal neurological disorder, e.g. hypoglycemia, meningitis, encephalitis, Demyelination disease, 5) patient/ guardian refused to give consent, 6) patient could not be contacted at day 30. Patients who fulfilled the inclusion and exclusion criteria and after taking written informed consent from their guardian they were enrolled in the study. After enrolment, detailed history was taken; systemic examinations and relevant laboratory investigations were done. The risk factors of age, hypertension, diabetes mellitus, ischemic heart disease (IHD) dyslipidaemia, anemia, and nicotine intake were evaluated. A blood pressure of 140/90 mm Hg above was taken to denote hypertension. Patients were considered diabetic and IHD from the medical history. The severity of stroke and the functional ability after the stroke were also evaluated by MRS. All patients had a focal neurological impairment of sudden onset, which had lasted more than 24 h. The strokes were confirmed by CT or magnetic resonance imaging (MRI). All clinical and biochemical parameters were recorded at admission, at discharge and at 30th day after admission. After collection, data was edited meticulously and entered into computer. Data was analyzed by computer based soft were SPSS. Student t test and chi-square test were done for comparison of outcome.

Results

The study was intended to observe the relationship of outcome of stroke at discharge and at 30 days with on admission blood pressure and other important risk factors. The outcome was evaluated by Modified Rankin Scale (MRS).

Mean systolic blood pressure of the patients was 158.35 mm of Hg (SD±32.29) with

minimum 90 and maximum 260 mm of Hg. Mean diastolic blood pressure was 94.35 mm of Hg (SD±17.12) with minimum 60 and maximum 140 mm of Hg. Out of 100 patients 32 had normal blood pressure and 68 had hypertension.

Mean GCS scale was 11.57 (SD±3.47) with minimum 3 and maximum 15. Frequency of patients in different GCS scale is shown in the Table I.

Table I: Distribution of patients by GCS status

GCS status	Frequency	Percent
<5	3	3.0
6-10	29	29.0
11-15	68	68.0
Total	100	100.0

By CT scan 60 patients infarction and 40 patients found haemorrhage.

Modified Rankin Scale (MRS) on admission was 1 to 5 with mean of 4.39 (SD±0.97). Mean Modified Ranking Scale on discharge was 3.78 (SD±0.99) which ranged from 1 to 6. Distribution of patient in different MRS on admission and discharge is shown in the Table II.

Table II: Distribution of patients by Modified Rankin Scale on admission

MRSs	On admission	On discharge
1.00	3	3
2.00	4	3
3.00	5	28
4.00	27	52
5.00	61	7
Total	100	100

Distribution of patients by prognosis at discharge according to Modified Rankin Scale is shown in the Table III.

Table III: Distribution of patients by prognosis at discharge (according to Modified Rankin Scale)

MRS	Frequency	Percent
0-2 (mild disability)	6	6.0
3-5 (moderate and severe disability)	87	87.0
Death	7	7.0
Total	100	100.0

Majority of the patients was in 6 Modified Ranking Scale on 30 day follow up (Table IV)

Table IV: Distributions of patients by Modified Rankin Scale on 30 day follow up

MRS	Frequency	Percent
0.00	12	12.0
1.00	22	22.0
2.00	19	19.0
3.00	10	10.0
4.00	9	9.0
5.00	4	4.0
6.00	24	24.0
Total	100	100.0

Outcome of patients in male and female is compared in the Table V.

Table V: Comparison of outcome between male and female participants.

Degree of disability discharge	sex		P
	male	female	
Death	2	5	
Mild disability	5	1	
Moderate disability	41	39	0.013
Severe disability	0	7	

Table VI: Comparison of outcome between patients with or without history of TIA

Degree of disability at discharge	HO TIA		P
	Absent	Present	
Death	7	0	0.549
Mild disability	5	1	
Moderate disability	66	14	
Severe disability	5	2	

Table VII: Comparison of outcome between hypertensive and normotensive patients

Degree of disability at discharge	Blood pressure		P
	Normal	Hypertensive	
Death	2	5	0.583
Mild disability	3	3	
Moderate disability	26	54	
Severe disability	1	6	

Table VIII: Comparison of outcome between patients with infarction or haemorrhage in the finding of CT scan of brain

Degree of disability at discharge	CT scan finding		P
	Infarction	Haemorrhage	
Death	6	1	0.021
Mild disability	6	0	
Moderate disability	42	38	
Severe disability	6	1	

Table IX: Comparison of outcome among different age group of the patients

Degree of disability at discharge	Age group						P
	21-30	31-40	41-50	51-60	61-70	71-80	
Death	1	0	1	2	2	1	0.679
Mild disability	0	2	1	2	1	0	
Moderate disability	4	10	20	25	15	6	
Severe disability	0	0	4	2	0	1	

Table X: Comparison of outcome between patients with or without history of smoking and taking tobacco

Degree of disability at discharge	History of smoking and taking tobacco		P
	Present	Absent	
Death	4	3	0.360
Mild disability	3	3	
Moderate disability	60	20	
Severe disability	4	3	

Table XI: Comparison of outcome between patients with or without history of hypertension

Degree of disability at discharge	History of hypertension		P
	Present	Absent	
Death	2	5	0.165
Mild disability	5	1	
Moderate disability	38	42	
Severe disability	2	5	

Table XII: Comparison of outcome between patients with or without history of ischaemic heart disease (IHD)

Degree of disability at discharge	History of IHD		P
	Present	Absent	
Death	0	7	0.567
Mild disability	1	5	
Moderate disability	5	75	
Severe disability	1	6	

Table XV: Comparison of outcome at 30 day follow-up between patients with or without history of hypertension

Degree of disability at 30 day follow-up	History of hypertension		P value
	Present	Absent	
Death	10	14	.208
Mild disability	28	25	
Moderate disability	9	10	
Severe disability	0	4	

Table XIII: Comparison of outcome between patients with or without history of diabetes mellitus (DM)

Degree of disability at discharge	History of DM		P
	Present	Absent	
Death	1	6	0.825
Mild disability	1	5	
Moderate disability	12	68	
Severe disability	2	5	

Table XVI: Comparison of outcome at 30 day follow-up between patients with or without history of IHD

Degree of disability at 30 day follow-up	History of IHD		P
	Present	Absent	
Death	2	22	0.923
Mild disability	4	49	
Moderate disability	1	18	
Severe disability	0	4	

Table XIV: Comparison of outcome at 30 day follow-up between patients with or without history of smoking and taking tobacco

Degree of disability at 30 day follow-up	History of smoking and taking tobacco		P
	Present	Absent	
Death	16	8	0.726
Mild disability	39	14	
Moderate disability	14	5	
Severe disability	2	2	

Table XVII: Comparison of outcome between patients with or without history of DM

Degree of disability at 30 day follow-up	History of DM		P
	Present	Absent	
Death	5	19	0.650
Mild disability	9	44	
Moderate disability	2	17	
Severe disability	0	4	

Table XVIII: Comparison of outcome at 30 day follow-up between sexes of the patients

Degree of disability at 30 day follow-up	sex		P
	male	female	
Death	8	16	0.213
Mild disability	30	23	
Moderate disability	9	10	
Severe disability	1	3	

Table XIX: Comparison of outcome between patients at 30 day follow-up with hypertension and normal pressure

Degree of disability at 30 day follow-up	Blood pressure		P
	Normal	Hypertensive	
Death	8	16	0.922
Mild disability	18	35	
Moderate disability	5	14	
Severe disability	1	3	

Table XX: Comparison of outcome at 30 day follow-up between patients with infarction or haemorrhage in the finding of CT scan of brain

Degree of disability at 30 day follow-up	CT scan finding		P
	infarction	haemorrhage	
Death	15	9	0.360
Mild disability	31	22	
Moderate disability	10	9	
Severe disability	4	0	
Total	60	40	

Table XXI: Comparison of outcome at 30 day follow-up between patients with different age group

Degree of disability at 30 day follow-up	Age group						P
	21-30	31-40	41-50	51-60	61-70	71-80	
Death	1	1	5	7	8		0.105
Mild disability	4	9	15	17	7	1	
Moderate disability	0	2	4	5	3	5	
Severe disability	0	0	2	2	0	0	

Discussion

The mean (\pm SD) age the patients were 54.33(\pm 12.9) years with a minimum of 22 years and maximum of 80 years. The most of the patients (31%) were in age group 51-60 years followed by age group 41-50 years. The age group with least sufferers is 21-30 years. Our result was supported by Sridharan et al (2009).⁶ They reported that stroke occurred at a median age of 67 years.⁶ Another study described that 77.8% patients were between 50 and 79 years of age. The youngest patient was 17 years and the oldest was 92 years old.⁷

The male-female ratio of our patients was 48:52. Our finding differs from the finding of another study in Chennai, India. They found male female ration 66:34. This variation may be due smaller sample size of our study.⁷

In Chennai study the authors showed that 72% stroke patient had hypertension whereas we found history of hypertension in 47% patients. The other causes of stroke may be prominent in our setting.⁷

The present study showed that while sixteen (16%) patients had history of diabetes while diabetes was present in 49.8% in Chennai stroke unit report. Possibly the difference was due to the fact that they included more number of older patients. So increased age may have presence of diabetes more likely.

This finding was much higher from our study.⁷

History of ischaemic heart disease was present in 7% patients and absent in 93% patients. IHD was present in 33.8% in Chennai study. It may be due to that same patient had multiple comorbid conditions.⁷

Habit of smoking was present in 27% and habit of taking tobacco leaf was present in 31% of patients. This observation is almost similar to our studies. They showed that tobacco use was prevalent in 23.6% of the patients.⁷

On CT scan finding 60% patients had infarction and 40% had haemorrhage. Our finding is supported by Sridharan et al (2009)⁶ who reported the incidence of ischaemic stroke 77% but differed by Becker, Wira, Arnold (2009)⁸ who found ischaemic stroke 85%.^{6,8} At discharge death and severe disability was present more in female than male participants. This difference was statistically significant ($p < 0.05$). However Chennai study and a study by Barrett et al (2007) showed different findings.^{4,7} The Chennai study examined the effect of gender on stroke outcome in the 354 patients and found no association between gender and stroke outcome.⁷ Barrett et al (2007) found no sex difference in stroke severity, stroke subtype, or infarct size and location in patients with incident ischemic stroke.⁴

In our study death and mild, moderate and severe disability were present more in hypertensive patients than normotensive patients. But this difference was not statistically significant ($p > 0.05$). This observation is similar to the observation of Chennai study. They also found no statistically significant difference between hypertensive and normotensive patients.⁷

Death and mild, moderate and severe disability at discharge were present significantly more in patients with infarction

than haemorrhage in the CT scan finding of the brain ($p < 0.05$). Our result is supported by several studies who found that the presence of a visible infarction on computed tomography up to 48 hours after stroke is an independent adverse prognostic sign.⁹ However death and morbidities were similar at 30 day follow-up.

Death and mild, moderate and severe disability were present more in patients with history of smoking and taking tobacco than those without such history. But this difference was not statistically significant ($p > 0.05$). Our findings are in agreement with those of Chennai study. They also found no association between smoking and stroke outcome.⁷

The difference between death and disability at discharge and 30 day follow-up present in patients with history of IHD and DM was not statistically significant ($p > 0.05$). This data is supported by Bushnell et al (2008).⁵ They stated that chronic heart disease and (CHD) and diabetes mellitus were each associated with functional outcome among women with ischaemic stroke.⁵

Conclusion

Stroke is a characterized by an abrupt onset of a non-convulsive and focal neurologic deficit which may remain fixed or rapidly improve or progressively worsens. It is the third most common cause of death in the developed world are responsible for a large proportion of physical disability. The risk factors for strokes are high blood pressure, diabetes mellitus, heart disease, high cholesterol, and increasing age. Some studies have examined the role of some selective risk factors like age, IHD, and DM in the out come of the disease. But the role of hypertension in the outcome of stroke patients has not been evaluated. We designed this study to evaluate the role of hypertension in the outcome of stroke.

The findings of the present study concluded that there barely an association between on admission blood pressure and stroke outcome

at discharged ($P > 0.05$) and on 30 day ($P > 0.05$). Also the findings of the present study shows that death and severe disability at discharge was significantly higher in female than male patients ($P < 0.05$). Death and disability were also more prevalent in patients with infarction than hemorrhagic stroke ($P < 0.05$). At 30 day follow up neither risk factors nor type of stroke is associated with outcome of the stroke.

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