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A Priliminary Study on In-hospital Outcome of Stroke in a Tertiary Centre of South Bengal, India

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Authors' contributions

This work was carried out in collaboration between all authors. Authors SC and PB designed the research and prepared the manuscript. Author AA managed the statistical analysis. Authors SC, MG, KG and AA carried out the manuscript preparation. All authors read and approved of the final manuscript.

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ABSTRACT

This single centre descriptive observational design study was undertaken in a tertiary referral centre of South Bengal, India in an attempt to assess the outcome of stroke according to various risk factors and Glasgow coma scale at the time of admission. A better outcome was considered as Glasgow outcome scale score of 4 and 5 while poor outcome was considered as Glasgow outcome scale score of 3 or less.

Keywords: Stroke; Glasgow coma scale; morbidity; descriptive study.

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1. INTRODUCTION

Stroke was defined by World Health Organization as 'A rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting for 24 hours or longer or leading to death, with no apparent cause other than due to vascular origin [1]. The 24 hours threshold in the definition excludes transient ischemic attack.

As the second most common cause of death it is responsible for nearly 9.7% deaths annually in the world [2]. Mortality data from 2008 had shown that one in every 18 deaths in United States was due to stroke and overall mortality attributed to stroke in USA was nearly 32.8% [3]. In India stroke accounts for nearly 9.4 million deaths every year and Disability Adjusted Life Year (DALY) loss due to stroke was around 28.5 million [4].

Indian Collaborative Acute Stroke Study (ICASS) has shown that in India about 77% cases of stroke are of ischemic origin, 22% are hemorrhagic and 2% are unspecified [4]. It has also revealed that apart from non modifiable risk factors like age, Stroke has various modifiable risk factors like hypertension, diabetes, obesity, heart disease and dyslipidemia [4].

Studies have clearly indicated that incidence of stroke is rising with increase in number of older population [3]. Although mortality of stroke has been reduced, the burden of the disease is increasing with time [3]. Cost involvements in stroke are great with huge DALY loss [5]. Almost half of the stroke patients suffer from physical and cognitive defect [5]. Such a high burden could be minimized if in-hospital outcome of the disease could be made favorable. This however needs profound knowledge of the factors which directly or indirectly influence the in-hospital outcome or prognosis of stroke. While many studies on stroke outcome have been performed in developed countries, very few have been done in Indian scenario.

Glasgow outcome scale was originally developed to predict outcome in head injury [6] patients but was also used later on to rank stroke patients [7]. It provides clinicians with a comprehensive measure of outcome and is a useful tool for deciding early intervention [7]. The scale assess stroke patients on five categories (a) no or minimal disability or handicap, (b) moderate disability, (c) severe disability, (d) persistent vegetative state, and (e) death. In the present study essential clinical parameters of stroke has been correlated with Glasgow outcome score at the time of discharge or death of the patient.

2. METHODS

The study was a descriptive type, conducted for duration of six months from June 2011 to December 2011. One hundred stroke patients (both ischemic and hemorrhagic), admitted in hospital were enrolled for the study. Patients with Transient Ischemic attack (TIA), Trauma, Vasculitis, Subdural and Extradural Hematoma, Tumour and those who developed nosocomial infection during the study were excluded. Written informed consent was obtained from each patient or their relatives if they were not in a state of giving consent.

2.1 Clinical History and Physical Examination

Detailed clinical history of stroke was obtained either from the patient or their family members with particular emphasis on a) Time of onset b) Mode of onset and evolution c) Premonitory symptoms d) Presenting symptoms e) Time spent in admitting the patient to hospital since onset f) Risk factors like Hypertension, Diabetes, Dyslipidemia, Smoking, Alcoholism, Heart disease, past history of Stroke or TIA, family history g) Medications. Every patient was subjected to thorough clinical examination, mainly focusing on level of consciousness, blood pressure, pulses, temperature, respiration and neurological findings.

2.2 Investigations

The patients also underwent the following investigations 1) Complete blood count 2) Blood sugar, urea, creatinine 3) Serum lipid profile 4) Serum sodium and potassium 5) Chest X-ray 6) Electrocardiography (EKG) 7) Echocardiography (where indicated) 8) Brain C.T scan.

2.3 Follow-up

All patients were followed up until their discharge or death, in case patient died in hospital, to find out in-hospital outcome of the stroke patients.

2.4 Data Analysis

The data has been presented as numbers with percentage (frequency). The significance of

difference between the proportions of qualitative characteristics has been tested using Chi-square test (of independent of attributes). The binary logistic regression was applied to estimate the odds ratio (OR) and corresponding 95% confidence interval (CI) for the determinates of Glasgow Outcome score. The p-values of less than 0.05 were considered statistically significant. The entire data was analyzed using SPSS version 16 (IBM-Chicago).

a) **Hypertension:** Patients were considered to have hypertension if they either had the diagnosis of hypertension or being treated for hypertension before stroke. The blood pressure was recorded after admission to the ward rather than using the emergency room measurements. Patients with hypertension, requiring treatment with drugs after stroke and two measurements of blood pressure (BP) more than 140/90 mm Hg after stroke were also considered to have hypertension. Patients with stroke who had transient hypertension resulting from increased intracranial pressure (Cushing reflex) or who did not receive anti-hypertensive treatment or patients with BP less than140/90 mm Hg at the time of discharge were not considered to have hypertension.
b) **Diabetes:** Patients were considered to have diabetes if they were diagnosed to have diabetes before stroke and either were on diet control or received medications. Those who had post-prandial blood sugar more than 200 mg% or fasting blood sugar more than 126 mg% after admission were also included as diabetics.
c) **Dyslipidemia:** A Patient was considered to have dyslipidemia when he had a diagnosis of it before stroke and was on diet or lipid lowering agents. Also a patient who had fasting blood cholesterol more than 250 mg/dl or fasting triglyceride more than 150 mg/dl was also considered to have dyslipidemia.
d) **Heart disease:** Patients were considered to have cardiac abnormality when they had self-reported history of any angina, acute coronary syndrome, coronary artery bypass grafting (CABG) or percutaneous transluminal angioplasty (PTCA). Each of these patients underwent 12 lead EKG and Echocardiography to diagnose any structural or functional cardiac abnormality. The presence of left ventricular hypertrophy and evidence of possible or definite myocardial ischemia was noted and atrial fibrillation, if any was documented.
e) **In-hospital outcome:** Outcome of stroke was assessed by Glasgow outcome scale at the time of discharge or death in hospital. A better outcome was considered as Glasgow outcome scale score of 4 and 5 while poor outcome was considered as Glasgow outcome scale score of 1, 2 and 3.
f) Data collected in this study were analyzed statistically by percentage and correlation was established through Chi-square or Fischer's exact test wherever indicated. P value <0.05 was considered significant.

3. RESULTS

3.1 Age and Sex of Stroke Patients

Mean age of subjects was 63.9±9.8 years. Mortality in stroke patients were found to be increasing with age (no mortality in age group <45 years with 9.5%, 24%, 71% mortality in age groups 45-60 yrs, 60-75 yrs and >75 yrs age groups respectively). In-hospital outcome was significantly poorer ($p<0.01$) in subjects more than 60 years when compared to those less than 60 years (Table 1).

Sixty four percent and 36% of the subjects were male and female respectively. Female subjects had poorer outcome (72%) in comparison to male subjects (53%) but the difference was not statistically significant. However, mortality in female subjects (44.5%) was significantly higher ($p<0.001$) than male subjects (12.5%) (Table 1).

3.2 Type of Stroke

Sixty two percent of the subjects had hemorrhagic stroke and 38% had ischemic stroke. 60% of the total subjects had poor outcome and overall mortality was 24%. Mortality was 29% in hemorrhagic stroke and 16% in ischemic stroke. Also Hemorrhagic stroke subjects had marginally poorer outcome than ischemic stroke (61% vs 58%) but after statistical analyses, the correlation of type of stroke with outcome was not significant in terms of both mortality and overall outcome (Table 1).

Table 1. Outcome wish distribution of demographic and clinical variables

	Poor outcome (%)	Better outcome (%)	Total (%)	P value
	G.O.S-1,2,3	G.O.S-4,5		
Total patients	60 (60%)	40 (40%)	100 (100%)	
Male	34 (53%)	30(47%)	64 (100%)	0.06 NS
Female	26 (72%)	10(28%)	36 (100%)	
Hemorrhage	38 (61%)	24 (39%)	62 (100%)	0.11 NS
Ischemic	22(58%)	16 (42%)	38 (100%)	
Age <60 yrs	18 (42%)	25(58%)	43 (100%)	0.0013 S
Age >60 yrs	42(74%)	15 (26%)	57 (100%)	
Admission to hospital <12 hrs	21 (36%)	37 (64%)	58 (100%)	0.10 NS
Admission to hospital >12 hrs	22 (52%)	20(48%)	42(100%)	
Conscious	13 (26%)	37 (74%)	50 (100%)	0.0001 S
Drowsy/Unconscious	47 (94%)	3 (6%)	50 (100%)	
Systolic BP 140-159	8(27%)	22 (73%)	30 (100%)	0.0001 S
Systolic BP > 160	52 (76%)	16 (24%)	68 (100%)	
Diabetic	22 (92%)	2 (8%)	24 (100%)	0.0002 S
Non diabetic	38 (50%)	38(50%)	76 (100%)	
Dyslipidemia present	10 (71%)	4 (29%)	14 (100%)	0.54 NS
No dyslipidemia	30(60%)	20(40%)	50 (100%)	
Heart disease	16(62%)	10(38%)	26 (100%)	0.85 NS
No heart disease	44 (59%)	30(41%)	74 (100%)	
Smoker	24(53%)	21(47%)	45 (100%)	0.95 NS
Non smoker	10(53%)	9(47%)	19 (100%)	
Alcoholic	8(57%)	6(43%)	14 (100%)	0.73 NS
Non alcoholic	26 (52%)	24(48%)	50 (100%)	
P/H of stroke	18(78%)	5(22%)	23 (100%)	0.04 S
No P/H of stroke	42(54.5%)	35(45.5%)	77 (100%)	
F/H of stroke	22(65%)	12(35%)	34 (100%)	0.5 NS
No F/H of stroke	38(57%)	28(43%)	66 (100%)	
Mass effect present	46(82%)	10(18%)	56 (100%)	0.0001 S
Mass effect not present	14(32%)	30(68%)	44 (100%)	
Cortical infarction	10(83%)	2(17%)	12 (100%)	0.04 S
Sub-cortical infarction	12(46%)	14(54%)	26 (100%)	
Large infarct	16(89%)	2(11%)	18 (100%)	0.0003 S
Lacunar infarct	6(30%)	14(70%)	20 (100%)	
Cortical hemorrhage	4(40%)	6(60%)	10 (100%)	0.14 NS
Sub-cortical hemorrhage	34(68%)	16(32%)	50 (100%)	
<30 ml bleed	14(39%)	22(61%)	36 (100%)	NA
>30 ml bleed	24 (100%)	0(0%)	24 (100%)	
I.V ext. present	24(92%)	2(8%)	26 (100%)	0.0001 S
No I.V ext. present	14(39%)	22(61%)	36 (100%)	

B.P: Blood Pressure, F/H: Family History, I.V: Intra Ventricular, NA: Not Applicable, NS: Non Significant, P/H: Past History, S: Significant. Values indicate number of stroke patients and percentage

3.3 Premonitory Symptoms

Fifty six percent of subjects had premonitory symptoms in various combinations out of which majority had headache (24%) and vertigo (20%).

3.4 Stroke Symptoms

Motor symptoms were found to be the predominant presenting feature (76%) followed by sensory abnormality (34%) and loss of consciousness was the third common presentation in this study (18%).

3.5 Delay in Admission

Delay in admission was associated with increase in mortality. Mortality was 15%, 23% and 33% in subjects with admission within 6hours, 6-12 hours and more than 12 hours respectively. Although Patients admitted more than 12 hours

had poorer clinical outcome than those admitted earlier than 12 hours (52% vs 36%), the correlation was statistically insignificant (Table 1).

3.6 Diurnal Pattern of Onset

In this study, it was found that in most of the cases (38%), stroke onset was between 6 am and12 noon, followed by equal incidence in evening (22%) and night (22%).

3.7 State of the Patient during Onset of Stroke

Data showed that more number of stroke cases happened when subjects were awake (82%) than when asleep (18%).

3.8 Consciousness Level at Presentation

Loss of consciousness at presentation was associated with higher mortality. While no death was found in subjects who were conscious at presentation, 24% and 72% mortality was observed in subjects who were drowsy and unconscious respectively. Also drowsy or unconscious patients had significantly poorer outcome (P<0.001) than conscious patients (94% vs 26%) (Table 1).

3.9 Risk Factors

Hypertension and smoking were two leading risk factors for the stroke subjects under study.

3.9.1 Hypertension

In this study 100% of hemorrhagic stroke patients and 95% of ischemic stroke patients were hypertensive. Among the100 patients, two patients had normal B.P and with a better outcome. Among 98 patients who presented with hypertension, 69% had systolic B.P greater than 160 mm Hg and the rest had systolic B.P within 140 and 159 mm Hg. Overall outcome was poorer in subjects who had B.P higher than 160 mm Hg (76% vs 27%) and association between poor outcome and higher blood pressure was statistically significant (p< 0.001) (Table 1).

3.9.2 Diabetes

Fourteen percent of hemorrhagic stroke patients and 10% of ischemic stroke patients were considered to have diabetes. Diabetics had poorer outcome than non-diabetics (92% vs 50%). Diabetes was also significantly associated with poor outcome (p<0.01) (Table 1).

3.9.3 Dyslipidemia

Six percent of Hemorrhagic stroke patients and 8% of ischemic stroke patients had dyslipidemia. Although subjects with dyslipidemia had more adverse outcome than those without (71% vs 60%), but it was not statistically significant (Table 1).

3.9.4 Heart disease

Two of Hemorrhagic stroke and 24% of ischemic stroke subjects had evidence of heart disease. Though subjects with evidence of heart disease had marginally poor outcome than those without (62% vs 59%) but this was not statistically significant (Table 1).

3.9.5 Smoking

Twenty Four of hemorrhagic stroke and 21% of ischemic stroke patients were smokers. Smokers and non-smokers had equal percentage of poorer outcome (53%) and the influence was not statistically significant (Table 1).

3.9.6 Alcohol

Six of hemorrhagic stroke and 2% of ischemic stroke subjects were alcoholics. Alcoholics had only marginally poorer outcome than non-alcoholics (57% vs 52%) but the influence was not statistically significant (Table 1).

3.9.7 Past history of stroke

Past history of stroke was found in 23% patients. Patients with past history of stroke had poorer outcome than patients without any past history (78% vs 54.5%) and the correlation was statistically significant (P<0.05) (Table 1).

3.9.8 Family history

Positive family history of stroke was present in 34% patients.. Positive family history had only marginally poorer outcome than patients without positive family history (65% vs 57%) and it was not statistically significant (Table 1).

3.10 CT Scan Features

3.10.1 Mass effect

Stroke patients with features of mass effect on CT scan had statistically significant (P< 0.001)

poorer prognosis than those without any mass effect (82% vs 32%) (Table 1).

3.10.2 Cortical vs sub-cortical infarction

The patients having cortical infarct had poorer prognosis than those with sub-cortical infarction (83% vs 46%) and the result was statistically insignificant (P<0.5) (Table 1).

3.10.3 Area of infarction

Patients who had large area of infarct had statistically significant poorer outcome (P<0.001) than those with lacunar infarct (89% vs 30%) (Table 1).

3.10.4 Cortical vs sub-cortical hemorrhage

In our study, two out of the 62 hemorrhagic stroke patients had subarachnoid hemorrhage It was observed that the remaining 60 patients with sub-cortical hemorrhage had statistically insignificant marginally poorer outcome than those having cortical hemorrhage (68% vs 40%) (Table 1).

3.10.5 Volume of bleeding

Among hemorrhagic stroke patients 24 patients with volume of bleeding more than 30 ml had poorer outcome than those with volume of bleeding less than 30 ml (100% vs 39%) (Table 1).

3.10.6 Intra-ventricular extension

Patients with intra-ventricular extension of bleeding had statistically significant (P<0.001) poorer prognosis than those without (92% vs 39%) (Table 1).

3.10.6.1 Determinants of glasgow outcome score

In this binary logistic regression analysis, good and bad Glasgow Outcome score were entered as dependent variable while adherence to Antihypertensive drugs, sex, consciousness on admission, age group, type of stroke, and past history of diabetes were entered as independent variables.

Analysis found consciousness on admission (p<0.05) and past history of diabetes (p<0.05) were statistically correlates with Glasgow outcome score in this population (Table 2).

4. DISCUSSION

Our study found a higher mortality with increasing age and overall outcome was poorer in patients more than 60 years age group (Table 1). A study conducted by Hollander et al. [8] had also shown an increase incidence of stroke with age.

Another similar study conducted by Appelros et al. [9] also showed higher age as an independent predictor for poor functional outcome in stroke.

Table 2. Variables in the equation

		P value	OD	95.0% C.I. for EXP( )	
				Lower	Upper
Adherence to Anti HTN drugs	Reference	.475			
Normotensive	.103	.930	1.109	.110	11.217
Defaulter of Anti HTN drugs	1.019	.316	2.770	.378	20.294
Male	Reference				
Female	1.401	.075	4.059	.870	18.927
Conscious on admission	Reference				
Unconscious and semiconscious on admission	5.170	.000	175.911	14.154	2186.227
Age less than 50	Reference	.270			
Age 51-65	2.172	.142	8.779	.485	159.046
Age more than 66	.332	.730	1.394	.211	9.228
Ischemic CVA	Reference				
Hemorrhagic CVA	1.010	.240	2.747	.508	14.847
No past H/O diabetes	Reference				
Past H/O diabetes	-2.993	.018	.050	.004	.593
Constant	-.780	.573	.459		

For standardized regression coefficients, Glasgow Outcome Score in Good condition (score 4-5) and bad condition (score 1-3) was taken as dependent variable whereas others taken as independent variables. Significant at p value <0.005 levels, CI = Confidence interval, OD= Odds ratio

Though mortality was significantly higher in male patients as compared to female in this study, correlation of sex with outcome was statistically non significant (Table 1). Fifty nine incidence studies from 19 countries had revealed that stroke incidence and prevalence is 33% and 41% higher in female than male and the outcome was found to be more severe in female with one month case fatality rate of 5% higher in female than male [10].

In the present study, hemorrhagic stroke patients had poorer outcome and increased mortality than ischemic stroke patients. But the influence of type of stroke on outcome was not significant (Table 1). The study conducted by Chiu et al. [11] also found that although intracerebral hemorrhage (ICH) was an independent predictor of poor neurological outcome, patients with haemorrahagic stroke did not show any statistically significant higher mortality than ischemic stroke patients.

In another hospital based study conducted by M. Barber et al. [12], it was found that ICH was associated with higher patient mortality (36% vs 13%) and increased disability (68% vs 52%) compared to ischemic stroke.

But after matching the baseline clinical characteristics, the higher mortality and disability in ICH group was not found to be statistically significant [12].

Nearly half of the patient had no premonitory symptoms in our study, Among those who had premonitory symptoms; headache and vertigo were top of the list. The study done by Evans et al. [13] showed that there was a significant association between vertigo and stroke.

But Kerber et al. [14], in their population based study found that the proportion of stroke patients presenting with dizziness or vertigo was very low (only 3.2%).

Our study also showed that delay in admission was associated with increased mortality and poorer outcome (Table 1). A similar study conducted by Dávalos et al. [15] also showed that stroke patients, admitted within six hours of onset had better outcome and shorter duration of hospitalization. A recent study conducted by Rincon et al. [16] had shown poor outcome at discharge for stroke patients who were not transferred in time from emergency unit to neurology intensive care unit.

A study conducted by Srivastav et al. [17] had revealed that long distance of hospital from home, lack of true knowledge regarding stroke symptoms and poor communication with local physicians were the main reasons behind the delay of admission of stroke patients in India.

In this study, it was observed that stroke onset was between 6am and 12 noon in the majority of the patients with most of the patients being awake at time of onset of stroke.

Framingham study had also revealed that most of the stroke cases occurred between 8 am and noon [18]. Such Circadian pattern of stroke was also supported by the study conducted by Gupta et al. [19].

The study done by Omama et al. [20] had shown that nearly 10% of Intracerebral hemorrhage and subarachnoid hemorrhage occurred during sleep which was nearly consistent with our result.

In the present study it was found that level of consciousness at the time of admission had a strong influence on outcome (Table 1). Those presenting in drowsy or unconscious state had an increased mortality and poor outcome. The study conducted by Heuschmann et al. [21] had also shown that altered level of consciousness was an important predictor of in-hospital mortality in case of stroke.

Our study had observed that the higher the blood pressure at presentation, the poorer the outcome (Table 1). The ICASS study had also established that hypertension alone (nearly 40%) and along with other risk factors (another 45%) is the most important risk factor for stroke. [4]Study conducted by Leonardi-Bee et al. [22] also showed a relationship between baseline systolic B. P. and both early and late death.

Although there was an old concept of leaving hypertension untreated specially in ischemic stroke, [23] few trials like Perindopril Protection Against Recurrent Stroke Study [24].

(PROGRESS) and the Individual Analysis of Antihypertensive Intervention Trials [25] (INDANA) had well established that timely control of blood pressure may prevent recurrent attack of stroke.

In this study diabetic patients had poor outcome in comparison to non- diabetic patients (Table 1). Kaarisalo et al. [26], from Finland also found in their study, that diabetes was associated with higher risk of death (20% in diabetic vs 16.9% in non diabetic) and disability (53.3% vs 33.5%) after onset of ischemic stroke. In another stroke

mortality study by Hamido et al. [27] from Malayasia, diabetes was found to be a significant independent predictor of mortality.

Although our study observed that stroke patients with dyslipidemia had marginally poorer outcome than patients without dyslipidemia, the association of dyslipidemia with outcome was not found to be significant (Table 1). A study carried out by Tziomalos et al. [28] had also shown that while dyslipidemia serves as a major risk factor for coronary artery disease, its role in stroke is debatable. However statins can reduce risk of ischemic stroke with or without coronary artery disease.

In the present study, patients with heart disease had marginally poorer outcome than patients without heart disease, but the association was not found to be statistically significant (Table 1). Although both Coronary artery disease (CAD) and Cerebro-vascular disease (CVD) share common risk factors and are included in the same spectrum of atherosclerotic artery disease; genetic analysis studies had revealed that certain genetic changes which are strongly associated with CAD are not significantly related to CVD [29].

However some heart diseases like atrial fibrillation are strongly associated with CVD [30]. The study revealed that smoking did not influence the overall outcome of stroke (Table 1). But in the study conducted by Ovbiagele et al. [31] it was shown that smokers had significantly poor outcome at 30 and 90 days following stroke. The difference in finding may be due to the fact that their study was a community based study whereas our study was hospital- based.

In our study, we have found only marginal insignificant difference in poor outcome among alcoholic and non alcoholic groups (Table 1). However the study conducted by M. Hillbom et al. [32] had shown that heavy drinking was a significant independent predictor of poor outcome, though mild drinking may be protective.

In this study it was found that patients with positive family history of stroke had poorer outcome in comparison to patients without family history of stroke, but the association of family history of stroke with outcome was not significant (Table 1).

Vicki Stover et al. [33], in their study found that the family history of stroke was not associated with in-hospital outcome. But Lisabeth et al. [34] in their study found that family history was associated with poor functional outcome.

The study revealed that patients with past history of stroke had statistically significant poorer outcome in comparison with those who had no past history of stroke (Table 1).

Heuschman et al. [21], in their study also found that previous history of stroke had a significant negative impact on early outcome.

Our study had shown that stroke patients with mass effect had statistically significant poorer outcome than stroke without mass effect (Table 1). A study done by Castellanos had also shown that mass effect in CT scan is a poor predictor of stroke [35].

In our study, it was found that among ischemic stroke patients, those with cortical infarct had poorer outcome than subcortical infarct and those with larger size of infarct had poorer outcome than lacunar infarct. Both results were statistically significant (Table 1). In one hospital based study from India by Paithankar et al. [36], it was found that site and size of infarct were significantly associated with functional outcome. Superficial infarct was found to be associated with poorer outcome ($P<0.004$) and there was significant association between large size of infarct ($P<0.005$) and poor outcome.

Patients with subcortical bleed had poor outcome than cortical bleed among ICH patients (Table 1). M. Castellanos et al. [35], in their study, also showed that cortical location of bleeding was independent predictior of better outcome than deeper location of bleeding.

Our study had observed that those with volume of bleeding above 30 mls of blood had poor outcome than patients with less than 30 mls of blood (Table 1). Broderick et al. [37], in their study found that volume of ICH was a powerful indicator to predict outcome. They found 19% mortality in patients with less than 30 mls of blood and 91% mortality in patients with more than 30 mls of blood.

Castellanos et al. [35] also observed that greater ICH volume on C T Scan was related to poor outcome.

In this study, patients with intra-ventricular extension of bleed had statistically significant poorer outcome than patients without intra-ventricular extension among hemorrhagic stroke

patients (Table 1). M. Castellanos et al. [35] showed that intra-ventricular extension was associated with poor outcome.

Major limitations of our study was a relatively small no of patients and as only moderate to severe stroke patients were admitted, our study lacks true representation in epidemiological point of view. This preliminary study should be correlated with larger epidemiological study before drawing a conclusion.

5. CONCLUSION

In conclusion this single centre hospital based observational study correlates lower Glasgow coma scale during admission with poorer outcome apart from various known risk factors. However referral bias and small number of patients may not reflect true epidemiological scenario which needs a multicentre and community based study before drawing conclusion.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for participation in this study'.

ETHICAL APPROVAL

All authors hereby declare that data were collected after getting approval from the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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