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Original Research Article

CLINICAL PROFILE AND OUTCOME OF PATIENTS ADMITTED WITH STROKE.

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Abstract: Introduction: Stroke, a global health problem, is the second commonest cause of death and fourth leading cause of disability worldwide. Effective primary and secondary prevention strategies, better recognition of at risk patients, early recognition and intervention, rapid advances in management and effective stroke rehabilitation has changed the traditional perception that stroke is simply a consequence of aging that inevitably results in death or severe disability
Materials and methods: A hospital based prospective study was carried out in a teaching hospital in Sikkim for a period of one year in which 112 subjects fulfilling the inclusion criteria of stroke were recruited and their details recorded. National Institute of Health Stroke Score (NIHSS) was used for prognostic status.
Results: 53.6% suffered from hemorrhagic stroke, 40.2% had ischemic and 6.2% hemorrhagic infarct.39.9% patients had history of previous TIA, 73.2% were smokers and 53.6% had history of alcohol intake.81.2% were hypertensive while 18.7% had diabetes mellitus. Mortality was higher in haemorrhagic stroke (48.3%) as compared to ischemic stroke (20%).
Conclusion: Increased awareness, early referral, dedicated stroke unit and wider use of MRI with perfusion and diffusion weighted technique would be beneficial in improving the outcome.

Key words: Stroke, NIHSS, Outcome.

Introduction

Stroke, a global health problem is defined by WHO as "rapidly developed clinical signs of focal disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin". It is the second commonest cause of death and fourth leading cause of disability worldwide. Approximately 20 million people each year will suffer from stroke and of these 5 million will succumb [1]. Stroke is a life changing event that affects not only the person who maybe disabled,

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but also for their caregiver and family. Utility analyses show that a major stroke is viewed by more than half of those at risk as being worse than death. Reliable morbidity and mortality estimates for stroke in India are limited due to incomplete documentation. ICMR estimates in 2004 indicated that stroke contributed 41% deaths and 72% disability adjusted life years among NCD. The global burden of disease study projects that total deaths from stroke by 2020 in India will surpass established market economies. While stroke mortality rates are declining or stabilising in developed countries experts are concerned of the emerging stroke epidemic in India. Economic burden caused by stroke is enormous. Two thirds of stroke occurs in low and middle income countries where the average age of patient with stroke is 15 years younger than that in high income countries.

The demographic profile, clinical profile and risk factors of stroke patients may differ from region to region. Effective primary and secondary prevention strategies, better recognition of at risk patients, early recognition and intervention, rapid advances in management and effective stroke rehabilitation has changed the traditional perception that stroke is simply a consequence of aging that inevitably results in death or severe disability.

Materials and Methods

A hospital based prospective study was carried out in a teaching hospital in Sikkim for a period of one year with the aim to study the clinical profile and outcome of patients admitted with stroke. A total of 112 subjects fulfilling the inclusion criteria were recruited. The inclusion criteria was all patients in the age group 18 years and above, who were admitted in Central Referral Hospital with symptoms and signs of stroke i.e. history of sudden onset focal neurological deficit followed by clinical examination suggestive of neurological deficit and later confirmed by CT scan. Patients suffering from external or internal head injuries as a result of any external trauma due to violence or road traffic accident were excluded from this study.

Study Instruments

1. A pre-structured proforma was used for collection of baseline information of the respondents.
2. Diagnosis of CVA was confirmed by CT scan.
3. National Institute of Health Stroke Score (NIHSS) was used for prognostic status.

Validity and Reliability of Study Instruments:

CT Scan for prediction of mortality; if total computed tomography features scoring more than 5, sensitivity is 71%, specificity is 100%, positive predictive value is 100% and negative predictive value is 91%. National Institute of Health Stroke Score (NIHSS); for prediction of mortality if NIHSS more than 22, sensitivity is 86%, specificity is 98, positive predictive value is 92% and negative predictive value is 95%.[2]

Data Collection Procedure:

On approval by Institutional Ethics Committee the screening and recruitment began. Informed written consent was obtained from either the patient or patient attendant, personal details of the patient and his illness was recorded by interview of patient (if conscious and oriented) or caregiver in the preformed coded proforma, followed by clinical examination and application of prognostic scale i.e. NIHSS and confirmation by CT scan, followed by intervention and reapplication of same prognostic scale at the time of discharge. In this study, the participants themselves act as their controls for assessment of prognostic status at the time of admission and discharge. A pre-test was conducted on 10 patients during two months prior to the commencement of the main study. This ensured the acceptability and time management of the application of study instruments and their adaptability to suit the local conditions.

Data Analysis

The data collected were tabulated and analyzed by SPSS (Statistical Package for Social Sciences) version 13. The results were calculated in terms of proportions/ percentages and depicted in the form of tables. Paired t-test was applied to compare the mean of prognostic

scores at admission and discharge for each type of stroke. Here, p-value < 0.05 was considered significant. In the present study the mean NIHSS before and after treatment was compared to assess the impact of treatment for different types of stroke. While applying this test, the patients who left against medical advice and who were referred to higher centers were excluded.

Results and Discussion

In the present study a total of 112 study subjects were enrolled out of which 53.6% suffered from hemorrhagic stroke, 40.2% had ischemic and 6.2% hemorrhagic infarct. The Kolkata study which determined the stroke subtypes in the community for the first time in India performed neuroimaging soon after stroke in 59.5% of cases. The imaging revealed cerebral infarct in 68% and cerebral hemorrhage in 32% of cases. There were relatively more cases of cerebral hemorrhage than that observed in western countries.[3] Jain S and Maheshwari MC concluded in their review of the Indian experience in the last 35 years that most studies have recorded a larger number of ischemic (53.7% to 89.7%) to hemorrhagic strokes (13.6% to 37.9%) as seen in western countries.[4]In the present study there was more number of hemorrhagic strokes observed than the ischemic stroke which may be because of following reasons:

1. The presentations of hemorrhagic stroke are usually more severe than ischemic stroke.
2. Transient ischemic attack and minor stroke tends to be ignored by the patients and they may not come to the hospital. The patients of ischemic stroke coming to hospital may be representing an iceberg phenomenon.
3. The neuroimaging technique used in the present study was NCCT which readily detects hemorrhage but could not detect early ischemic stroke and lacunar infarct. In the present study only CT confirmed cases were included and the repeat CT scan was not possible in all of the suspected ischemic infarct cases.

The distribution profile of patients according to the age, sex, ethnicity, type of family, marital status, living status, education status, occupation & previous history of stroke is as shown in Table 1.

Table 1: Demography of patients presenting with stroke

	Type of stroke		
	Ischemic	Hemorrhagic	Hemorrhagic infarct
Demographics	n=45 (100%)	n=60 (100%)	n=7 (100%)
Age			
Less than 45 years	5 (11.1)	10 (16.7)	0 (0.0)
45-65 years	17 (37.8)	26 (43.3)	4 (57.1)
More than 65 years	23 (51.1)	24 (40.0)	3 (42.9)
Sex			
Male	22 (48.9)	39 (65.0)	4 (57.1)
Female	23 (52.1)	21 (35.0)	3 (42.9)
Ethinicity			
Lepcha	1(2.2)	3 (5.0)	1 (14.3)
Bhutia	4(8.9)	4 (6.7)	0 (0.0)
Nepali	35(77.8)	46 (76.7)	5(71.4)
Others	5(11.1)	7 (11.6)	1 (14.3)
Type of family			
Nuclear	8 (17.8)	8 (13.3)	2 (28.6)
Joint	37 (82.2)	52 (86.7)	5 (71.4)
Marital status			

Single	1 (2.2)	4 (6.7)	0 (0.0)
Married	41 (91.1)	49 (81.7)	5 (71.4)
Widowed	3 (6.7)	7 (11.6)	2 (28.6)
Living status Living alone	0 (0.0)	2 (3.3)	0 (0.0)
With spouse	41 (91.1)	49 (81.7)	5 (71.4)
With only children/relatives	4 (8.9)	9 (15.0)	2 (28.6)
Education Illiterate	25 (55.6)	34 (56.7)	6 (85.7)
Literate	20 (44.4)	26 (43.3)	1 (14.3)
Occupation Unemployed	22 (48.9)	27 (45.0)	3 (42.85)
Unskilled	13 (28.9)	17 (28.3)	3 (42.85)
Skilled	10 (22.2)	12 (20.0)	0 (0.0)
Financial status Totally dependent	23 (51.1)	26 (43.3)	3 (42.9)
Partially dependent	12 (26.7)	16 (26.7)	0 (0.0)
Independent	10 (22.2)	18 (30.0)	4 (57.1)
Previous history of stroke No	38 (84.4)	54 (90.0)	6 (85.7)
Yes	7 (15.6)	6 (10.0)	1 (14.3)

Previous History of Tia Or Stroke

In the present study, only 15.6% of ischemic stroke, 10% of hemorrhagic stroke and 14.3% of hemorrhagic infarct subjects had history of stroke in past which seems to be an underestimate as per current literature. These observations may be because of the lack of awareness among the population about these conditions.

Patients who suffer TIAs are at greater risk of stroke than normal controls for death from vascular causes. The risk of stroke is approximately three times higher. Approximately 10-15% of those experiencing a stroke have TIAs before their stroke. TIAs are a strong indicator of subsequent stroke, with annual risk rising from 1% to 15%. The first year after a TIA seems to have the greatest stroke risk. Patients with a first stroke are at greater risk of recurrent stroke. Those who suffer a recurrent stroke have a higher mortality than patients with first stroke. If the recurrence is contralateral to the first stroke, prognosis for functional recovery is poor. The burden of transient ischemic attack is higher than previously known. Rothwell PM and Warlow CP[5] reported history of TIA in 15-20% patients with stroke while Kaur et al[6] reported history of TIA in only 9% cases.

Table 2: Addiction, co morbidities and interval between onset and presentation of patients with stroke

Addiction & co morbidities	Type of stroke		
	Ischemic	Hemorrhagic	Hemorrhagic infarct
	n=45 (100%)	n=60 (100%)	n=7(100%)
Smoking habit			
Smoker	34 (75.6)	43 (71.7)	5 (71.4)
Non-smoker	11 (24.4)	17 (28.3)	2 (28.6)
Alcohol habit			
Alcoholic	20 (44.4)	40 (66.7)	3 (42.9)
Non-alcoholic	25 (55.6)	20 (33.3)	4 (57.1)
Hypertension			
No	8 (17.8)	11 (18.3)	2 (28.6)
Yes	37 (82.2)	49 (81.7)	5 (71.4)
Diabetes			
No	34 (75.6)	51 (85.0)	6 (85.7)
Yes	11 (24.4)	9 (15.0)	1 (14.3)
Cardiac illnesses			
No	34 (75.6)	54 (90.0)	6 (85.7)
Yes	11 (24.4)	6 (10.0)	1 (14.3)
Interval between onset and presentation			
Less than 3 hour	2 (4.4)	8 (13.3)	0 (0.0)
3 - 24 hour	22 (48.9)	37 (61.7))	4 (57.1)
1 - 7 days	20 (44.4)	14 (23.3)	2 (28.6)
More than 7 days	1 (2.2)	1 (1.7)	1 (14.3)

Smoking

In the present study 73.2% study subjects were smokers. They were 75.6% among ischemic stroke, 71.7% among hemorrhagic stroke and 71.4% among hemorrhagic infarct subjects.

Cigarette smoking is an independent risk factor for ischemic stroke in men and women of all ages, and a leading risk factor of carotid atherosclerosis in men. The risk of stroke in smokers is two to three times greater than nonsmokers. The association of long duration cigarette smoking in the development of carotid atherosclerosis is well documented.[7] Although smoking is a strong risk factor for subarachnoid hemorrhage (relative risk about 3.0) and for ischemic stroke (relative risk about 2.0) there appears to be less association with PICH. Ex-cigarette smokers have a sustained excess risk of stroke for some years.[8]Kaul et al found smoking habit in 28%cases.[9]

Alcohol

In the present study, 53.6% study subjects were alcoholic. They were 66.7% among hemorrhagic stroke, 44.4% among ischemic stroke and 42.9% among hemorrhagic infarct subjects. While heavy alcohol consumption may be an independent, and in some way causal risk factor, more obviously for hemorrhagic than ischemic stroke, it seems that modest consumption might even be protective for ischemic stroke. There is a J-shaped association between alcohol consumption and ischemic stroke; light to moderate use (up to two drinks a day) evenly distributed in the week offers a reduced risk, whereas heavy drinking is associated with increased risk of total stroke.

Naik M et al[10] reported history of alcohol intake in 30.5%cases.

Hypertension

In the present study, 81.2% study subjects were hypertensive. They were 82.2% among ischemic stroke, 81.7% among hemorrhagic stroke and 71.4% among hemorrhagic infarct subjects. There was an excess of hypertensives in the present study which may be because it was a hospital based study.Hypertension is the most readily recognized factor in the genesis of primary intracerebral hemorrhage. It appears that the stroke producing potential is as much the product of heightened systolic pressure as of diastolic pressure. In healthy populations, in both sexes and allowing for the association with age, increasing blood pressure is strongly associated with subsequent stroke risk, and probably with all the main pathological types. The percentage difference in stroke risk associated with a given difference in blood pressure is similar, in males and females, at all levels of blood pressure and about doubles with each 7.5 mmHg increase in usual diastolic blood pressure in western populations, and with each 5.0 mmHg in Japanese and Chinese populations. [8]

Arterial hypertension is the most important modifiable risk factor for stroke. It predisposes to ischemic stroke by aggravating atherosclerosis and accelerating heart disease, increasing the relative risk of stroke three to fourfold. Blood pressure treatment resulting in a reduction in systolic blood pressure of 10-12 mmHg and 5-6 mmHg diastolic is associated with a 38% reduction in stroke incidence [11]. In a retrospective epidemiological study Lavy S et al [12]found that 42% had hypertension for the total stroke series. Naik M et al reported HTN in 40.7% of all cases of stroke and Kaur et al reported HTN in 48.8% of hemorrhagic & in 32.7% of ischemic strokes.

Diabetes

In the present study diabetes was observed among 18.7% study subjects. It was observed in 24.4% of ischemic stroke, 15% of hemorrhagic and 14.3% of hemorrhagic infarcts subjects.

In a retrospective epidemiological study Lavy S et al found that 20% had diabetes for the total stroke series. Diabetes hastens the atherosclerotic process in both large and small arteries. Diabetes mellitus has long been recognized as a risk factor for vascular disease and about doubles the risk of stroke compared with non-diabetics, probably independently of any association with other risk factors such as hypertension. Stroke in diabetics are more likely to be fatal. Diabetes mellitus increases the risk of ischemic stroke two to fourfold compared with the risk in non-diabetics. In addition, diabetes mellitus increases morbidity and mortality after stroke. The excess stroke risk is independent of age or blood pressure status. Diabetic persons with retinopathy and autonomic neuropathy appear to be a group at particularly high risk for ischemic stroke.

Table 3: NIHSS at admission & discharge and outcomes of patients presenting with stroke

	Type of stroke		
	Ischemic	Hemorrhagic	Hemorrhagic infarct
NIHSS	n=45 (100%)	n=60 (100%)	n=7 (100%)
NIHSS at admission			
Less than 10	14 (31.1)	14 (23.3)	2 (28.6)
10 – 20	13 (28.9)	12 (20.0)	3 (42.8)
More than 20	18 (40.0)	34 (56.7)	2 (28.6)
NIHSS at discharge			
Less than 10	26 (57.8)	17 (28.3)	5 (71.4)
10 – 20	5 (11.1)	3 (5.0)	0 (0.0)
More than 20	14 (31.1)	40 (66.7)	2 (28.6)
Outcomes			
Discharge to home	26 (57.8)	13 (21.7)	4 (57.1)
Left against medical	7 (15.5)	10 (16.7)	1 (14.3)

advice			
Referred to higher center	3 (6.7)	8 (13.3)	1 (14.3)
Expired	9 (20.0)	29 (48.3)	1 (14.3)

NIHSS and prognostic status

The prognosis for survival after cerebral infarction is better than after cerebral or subarachnoid hemorrhage. Loss of consciousness and massive infarct implies a poorer prognosis. Elderly patients, larger size of hematoma, ventricular extension, midline shift, brainstem compression, cerebellar hematoma are poor prognostic factors in hemorrhagicstroke . The National Institute of Health Stroke Scale (NIHSS) is a graded neurological examination that assesses speech, language, inattention, visual field abnormalities, motor and sensory impairments and ataxia. The scale was developed for use in acute-stroke therapy trials. It has been widely used as a standard part of the assessment in clinical trials. NIHSS is a systematic assessment tool that provides a quantitative measure of stroke-related neurologic deficit. The NIHSS was originally designed as a research tool to measure baseline data on patients in acute stroke clinical trials. Now, the scale is also widely used as a clinical assessment tool to evaluate acuity of stroke patients, determine appropriate treatment, and predict patient outcome The NIHSS is not time consuming to administer, taking less than 8 minutes to perform. Overall inter rater reliability has been shown in multicenter stroke trial. NIHSS reliability has been extended to non neurologist physicians & non physician coordinators in clinical trials. This reliability improves with personal and video tape training. Factor analysis demonstrated content validity of the NIHSS. Regarding outcomes, the NIHSS has very good sensitivity, specificity, and accuracy in predicting clinical results at 3 months.

Table 4:NIHSS of all patients with haemorrhagic stroke

	Mean	N	Std. Deviation	Std. Error Mean
NIHSS at admission	21.52	42	12.883	1.988
NIHSS at discharge	30.14	42	17.980	2.774

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
NIHSS at admission - NIHSS at discharge	-8.62	12.914	1.993	-12.64	-4.59	-4.325	41	.000

The mean NIHSS at admission was 21.52 which was an indicator of poor prognosis at admission itself. The mean NIHSS at discharge was 30.14 which indicated the poorer prognosis. The mean duration of hospitalization was 5.60 days. The paired t-test was applied after excluding the study subjects who left against medical advice and who were referred to higher neurological

center. The negative t-value i.e. -4.325 with two tailed significance (p-value) < 0.001 indicates that there was statistically significant deterioration of the study in spite of treatment.

As mortality was high among hemorrhagic stroke subjects, so the same test was applied again after excluding the expired study subjects.

Table 5:NIHSS of all surviving patients with haemorrhagic stroke

	Mean	N	Std. Deviation	Std. Error Mean
NIHSS at admission	8.46	13	4.095	1.136
NIHSS at discharge	3.69	13	2.626	.728

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
NIHSS at admission - NIHSS at discharge	4.77	2.455	.681	3.29	6.25	7.005	12	.000

The mean NIHSS at admission was 8.46 which was an indicator of good initial prognosis. The mean NIHSS at discharge was 3.69 which indicated improvement and better prognosis. The mean duration of hospitalization was 10.38 days. The comparison of mean NIHSS at admission and discharge among surviving patients was having t-value 7.005 and two tailed significance (p-value) < 0.001 suggesting that there was significant improvement in these study subjects.

Table 6: NIHSS of all patients with ischemic stroke

	Mean	N	Std. Deviation	Std. Error Mean
NIHSS at admission	18.23	35	11.780	1.991
NIHSS at discharge	15.31	35	16.547	2.797

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
NIHSS at admission - NIHSS at discharge	2.91	13.406	2.266	-1.69	7.52	1.286	34	.207

The mean NIHSS at admission was 18.23 and at discharge it was 15.31 which was suggestive of improvement. The mean duration of hospitalization was 10.49 days. The t-value 1.286 and two tailed significance (p-value) 0.207 indicates that the improvement was not statistically significant in spite of treatment.

After exclusion of expired study subjects, the results of paired t-test was as follows

Table 7: NIHSS of all surviving patients with ischemic stroke

	Mean	N	Std. Deviation	Std. Error Mean
NIHSS at admission	14.77	26	10.897	2.137
NIHSS at discharge	6.08	26	5.222	1.024

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
NIHSS at admission - NIHSS at discharge	8.69	9.371	1.838	4.91	12.48	4.730	25	.000

The mean NIHSS at admission was14.77 and at discharge was 6.08 indicating more improvement in this group. The mean duration of hospitalization was 11.88 days. The t-value 4.730 and two tailed significance (p-value) < 0.001 indicates statistically significant improvement.

Table 8: NIHSS of all patients with hemorrhagic infarct)

	Mean	N	Std. Deviation	Std. Error Mean
NIHSS at admission	15.40	5	12.462	5.573
NIHSS at discharge	10.80	5	17.470	7.813

	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
NIHSS at admission - NIHSS at discharge	4.60	8.204	3.669	-5.59	14.79	1.254	4	.278

The mean NIHSS at admission was15.40 and at discharge was 10.80 suggestive of improvement. The mean duration of hospitalization was 10.20 days. The t-value 1.254 and two tailed significance (p-value) 0.278 indicates that the improvement was not statistically significant. As the number of hemorrhagic infarct subjects were very less i.e. 5, so it is difficult to conclude about any statistical significance in this case.

Conclusion:

A community based case control study to look for incidence and prevalence of different types of stroke as well as to identify the associated

risk factors would be beneficial. A knowledge, attitude and practice study can be conducted among health care workers in community about stroke including risk factors and health education can be imparted to ensure prevention by control of risk factors, early identification of stroke and speedy referral to a tertiary care center. This would enable wider use of thrombolytic therapy. Establishment of a dedicated stroke care unit with multidisciplinary approach may help in better outcome. Wider use of MRI with perfusion and diffusion weighted technique will help in early confirmation of ischemic stroke and help in extending the time window for thrombolysis by imaging of salvageable brain tissue.

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