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Research Article

Clinical Profile of Patients Presenting With Recurrent Stroke at a Tertiary Care Center

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Abstract

Background: Recurrent stroke provides a higher risk of fatal or debilitating complications than a first-time stroke. Over the past 40 years, the death rate from initial strokes has reduced, but the number of people at risk for subsequent strokes has grown. In order to help doctors, prescribe the most effective treatment options to lower the risk of recurrent stroke while also informing patients about the risk factors involved and strategies to reduce stroke recurrence, this study was aimed at determining the proportion and the underlying risk factors involved in recurrent stroke.

Methodology: Total 84patients with recurrent stroke were studied at a single centre. A detailed history was taken and neurological examination relevant to stroke was performed. Baseline investigations like CH LFT, KFT, RBS, Lipid Profile and Chest X-Ray were done. Diagnosis of the stroke was confirmed by CT/MRI of the brain.

Results: The prevalence of recurrent stroke was 25.8%. Among risk factors, alcohol consumption was reported in 34.5% of recurrent cases, smoking reported in 32.1% cases, tobacco use found in 9.5% cases, diabetes mellitus occurred in 53.57% cases and hypertension encountered in 82.1% patients. The cause of recurrence involved patient related factors in 75% cases, drug related factors in 2.4% cases and disease related factors in 45.2% cases.

Conclusion: Present study concluded that recurrent stroke is common in our area. The most common factor responsible for recurrence is the patient related factors.

Keywords: Recurrent stroke, Tertiary care center, Clinical profile, Neurological examination

Introduction

One of the most expensive diseases for society, both economically and from a humanitarian standpoint, is stroke. Recurrent stroke provides a higher risk of fatal or debilitating complications than a first-time stroke. Over the past 40 years, the death rate from initial strokes has reduced, but

the number of people at risk for subsequent strokes has grown, leading to an increase in morbidity and medical expenses (1). In the first year following the original stroke, there are roughly 12% more cases of recurrent ischemic stroke (IS). However, the MONICA experiment of the World Health Organization revealed that recurrent stroke risk was about 27% (2).

In India, there are 13 to 15 million new stroke cases each year. More than 80% of all stroke-related fatalities are reported to occur in developing nations, making stroke the leading cause of mortality and disability worldwide. Even three months later, over 20% of survivors require ongoing hospital care. Stroke causes epilepsy, depression, and dementia in addition to significant motor dysfunction in another third of cases. In the Indian population, stroke is related to a case fatality rate of roughly 41%. 19.27 percent of deaths were from recurrent strokes, while the index stroke was the main cause of almost 70.45 percent of deaths. 8.2 percent of 2584 stroke patients in one research who were using dual anti-platelet medications experienced another stroke. Another study revealed a 14.1% chance of a recurrence two years after a stroke (3).

It is unknown which risk factors predominate and if individuals who experience recurrent stroke have received appropriate secondary prophylaxis. In controlled trials, recurrent stroke prevention has been effective, but less so in the general population. To stop neurological damage and reduce death from recurring episodes, secondary stroke prophylaxis is just as crucial as treating acute ischemic stroke. According to some writers, managing stroke risk factors as effectively as possible may lead to further advancements in treatment options and a decrease in the chance of having another stroke (3).

In order to help doctors, prescribe the most effective treatment options to lower the risk of recurrent stroke while also informing patients about the risk factors involved and strategies to reduce stroke recurrence, this study was aimed at determining the proportion and the underlying risk factors involved in recurrent stroke at HIMS. The objective of the study was to estimate the proportion of recurrent stroke and to find out the risk factors, etiology and their relative impact in stroke recurrence (patient related, drug related, disease related).

Methods

The study was conducted in the host institute over 12 months. The study population included the patients presenting to the Medicine Out-Patient Department (OPD) or admitted in medicine wards with a primary diagnosis of recurrent stroke. Patients were included in the study after obtaining a written informed consent and ethical clearance from the institutional ethics committee.

The study was an observational, single centric and hospital-based study. The sample size was calculated based upon the prevalence of recurrent stroke over the one-year duration which 7% was. By taking the prevalence level of 7%, precision level of 5% at 95% confidence level, the sample size came out to be 101. In present study we have reported total 84 cases of recurrent stroke over the duration of one year. Every case fulfilling the inclusion criteria was included in the study by consecutive sampling.

Inclusion Criteria

All patients presenting with recurrent stroke (ischemic or hemorrhagic) above 18 years of age. Recurrent stroke was defined as any stroke occurring 24 hours after the onset of the incident stroke, irrespective of vascular territory.

Exclusion Criteria

Patient with a history of stroke following head injury/trauma.

Study Tools

Structured case recording proforma

Study Protocol

A detailed history was taken and neurological examination relevant to stroke was performed. The medical history was included (but not limited to) information on hypertension, diabetes, myocardial infarction, atrial fibrillation,

congestive heart failure, chest pain, and history of coronary angioplasty or coronary artery bypass graft surgery.

Baseline investigations like CH LFT, KFT, RBS, Lipid Profile and Chest X-Ray were done. Diagnosis of the stroke was confirmed by CT/MRI of the brain. Patient was then being categorised based on type of stroke: i.e., ischemic or haemorrhagic stroke. Subsequently relevant laboratory investigations were sent if required depending on type of stroke like B/L carotid artery doppler, serum homocysteine levels, Holter monitoring, 2D - ECHO, coagulation profile and other special investigation.

Statistical Analysis

All data were analysed with SPSS software (version 23).Student's t test was used for comparison of quantitative data. Fisher's exact testor Chi square test was used for statistical comparison of qualitative variables. A 'p' value of less than 0.05 was considered statistically significant.

Results

Out of total 327 patients recruited in the study; 243 (74.32%) patients presented with first time stroke whereas another 84(25.68%) patients presented with the recurrent stoke which mark the proportion of recurrent stroke as 25.68% with the mean duration of recurrence was 34.82 ± 29.84 months with median 25.37 months and IQR of 12.17-48.70 months. The mean age of patients presenting with recurrent stroke to our center was 63.51 ± 13.31years. 54 (64.3%) patients were male and remaining 30 (35.7%) patients were females. Out of the total 84 patients of recurrent stroke, addiction history revealed alcohol consumption in 29 (34.5%) patients, smoking in 27 (32.1%) patients and tobacco use in 8 (9.5%) patients. 20 patients do not have any addiction (23.8%). Personal history revealed diabetes mellitus in 45 (53.57%) patients and hypertension in 69 (82.1%) patients. Amongst all patients with diabetes and hypertension, risk for recurrent stroke was higher in patients with poor drug compliance. (Table 1)

Table 1: Baseline characteristics and clinical characteristics of patients with recurrent stroke (n= 84)

Variable	Categories	Number of Patients	Percentage
Stoke case	Total cases	327	100
	New Stroke	243	74.32
	Recurrent stroke	84	25.68
Age	Young (15-50 years)	15	17.86
	Adults (>50 years)	69	82.14
Gender	Male	54	64.3
	Female	30	35.7
Addictions	Smoking	27	32.1
	alcohol	29	34.5
	tobacco	8	9.5
	No addiction	20	23.8
Diabetes Mellitus (N=45)	Good	11	24.4
	Poor	34	75.6
Hypertension (N=69)	Good	21	30.4
	Poor	48	69.6

The laboratory parameters and imaging findings in acute ischemic stroke patients are shown in Table 2. The mean RBS amongst recurrent stroke patients was found to be 186.1 ± 92.99mg/dL and mean Hb1Ac (%) was 7.988 ± 2.042. Of all the patients of recurrent stroke, the mean values of total cholesterol was found to be of normal range i.e 179.1 ± 52.78mg/dL in most of the patients. However, triglycerides were slightly on the higher side i.e 155.6 ± 69.65mg/dl

in most of the patients. The mean values of creatinine was found to be slightly on higher side of normal i.e. 1.044 ± 0.8951μmol/L in most of the patients and serum potassium values were on higher side i.e., 5.840 ± 14.94mEq/L.

Table 2: Laboratory profile and imaging findings of patients with acute ischemic stroke at the time of admission

Variable	Sub domain	Mean ± SD
Hemogram	HB	12.83 ± 2.050
	TLC	10.38 ± 4.618
	PLC	208.0 ± 66.75
Serum Homocysteine	Mean	13.89 ± 9.131
Lipid profile	Total Cholesterol	179.1 ± 52.78
	HDL	41.12 ± 12.46
	LDL	100.3 ± 45.86
	TG	155.6 ± 69.65
Renal function	Creatinine	1.044 ± 0.8951
	Sodium	137.6 ± 4.639
	Potassium	5.840 ± 14.94
Liver function	Total Bilirubin	0.8197 ± 0.4399
	AST	41.72 ± 30.83
	ALT	33.45 ± 22.69
	Albumin	3.820 ± 0.5030

The ECG and radiological findings of the patients with recurrent stroke is presented in Table 3. Amongst recurrent stroke patients, 2D ECHO finding revealed ejection fraction of more than 50% in 63 (75%) patient and <50% in 7 (8.33%) patients. 12 lead ECG of patients presenting with recurrent stroke revealed Atrial fibrillation in total 10 patients (11.90%) which had a valvular cause in 3 (30%) patients and non-valvular cause in 7 (70%) patients.

Table3: ECG and Radiological findings of the patients with recurrent stroke (n = 84)

Variable	Sub domain	N	Percentage
ECG			
AF ON ECG	Valvular	3	30
	Non-valvular	7	70
Normal ECG		74	88.10
2D ECHO			
LVEF	≥50%	63	75
	<50%	7	8.33
	Not done	14	16.67
Valve	Mild	10	11.9
	Severe	1	1.19
	Post MVR	2	2.38
	Normal	57	67.86
	Not Done	14	16.67
Wall Hypokinesia	Regional	3	3.57
	Global	4	4.76
	Not Observed	63	75
	Not Done	14	16.67
USG DOPPLER			
Extra-Cranial Stenosis	>70%	9	10.71
	(<70%)	34	40.48
Intracranial Stenosis		4	4.76
Not done		37	44.05

Regarding the cause of recurrence of stroke, the most common factors responsible for recurrence of stroke were patient related. Most of the patients with prior history of a cerebrovascular accident or stroke had poor drug compliance 60 (71.4%) cases and only 24 (28.6%) cases had good compliance to drug therapy. (Table 4)

Table 4: Cause of Recurrence of Stroke and drug compliance in previous stroke

Variable	Sub domain	N	Percentage
Cause of recurrence	Patient Related Factors	63	75.0
	Drug Related Factors	2	2.4
	Disease Related Factors	38	45.2
Drug compliance	Good	24	28.6
	Poor	60	71.4

Among patients with recurrent stroke, in ischemic stroke group, the most common cerebral artery involved was middle cerebral artery(47.62%patients).Also a few patients had involvement of dual vascular territories like the MCA+PCA was involved in 4 (4.76%) patients and MCA+ACA involved in 2 (2.38%) patients. The most frequently affected part of brain was corona radiata was involved in 8 (9.52%) patients, and multiple Infarct state was found to be in 3 (3.57%) patients.Amongst haemorrhagic stroke patients, most of the patients had involvement of the basal ganglia and thalamic areas i.e5(5.95%) patients. (Table 5)

Table 5: Radiological findings of the areas and vascular territories involved in recurrent stroke

Variable	Sub domain	Ischemic stroke (N and %)		Hemorrhagic Stroke (N and %)	
Territory	ACA	2	2.38	0	0
	MCA	40	47.62	0	0
	PCA	5	5.95	0	0
	MCA+PCA	4	4.76	0	0
	MCA+ACA	2	2.38	0	0
	Basal ganglia	0	0	5	5.95
	Cerebellum	1	1.19	1	1.19
	Pontine	1	1.19	0	0
	Thalamus	4	4.76	5	5.95
	Corona Radiata	8	9.52	0	0
	Multiple Infract	3	3.57	0	0
	SAH	0	0	1	1.19
	Parietal	0	0	2	2.38

Patients with previous history of stroke were evaluated for drug prophylaxis used and it was found that 27 (48.21%) patients were not taking any prophylaxis. On the other hand, 23 (41.07%) patients were on singleanti-platelet, 3 (5.36%) patients were on dual anti-platelets and anticoagulation was used by 3 (5.36%) cases. (Figure 1)

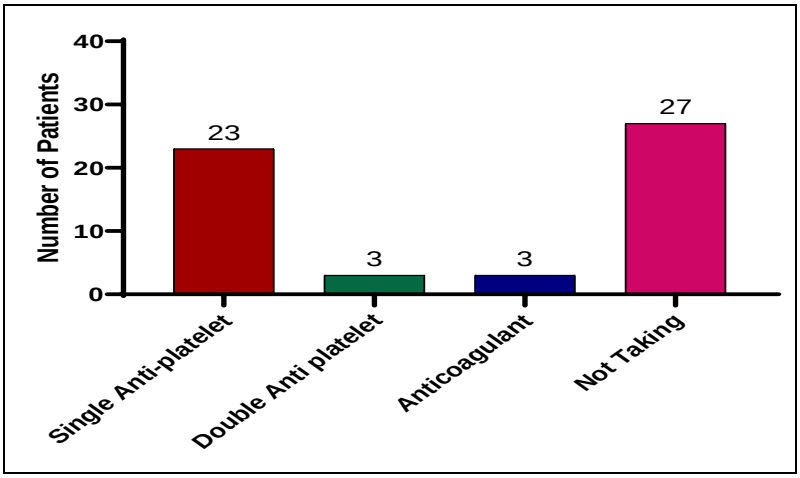

Figure 1: Prophylaxis used following previous (Ischemic) stroke

Discussion

Out of total 327 patients recruited in the study; 243 (74.32%) patients represented with first time stroke whereas another 84 (25.68%) patients presented with the recurrent stoke which mark the proportion of recurrent stroke as 25.68%. This data is supported by the previous studies which reported that approximately 10-30% of strokes in population-based studies are recurrent events (4-6).The incidence of recurrent stoke was found to be varied in various studies both on spatial and temporal basis. According to reports, the probability of having another stroke increases from 7.0 to 20.6 percent during the first year, from 16.2 to 35.3% within the first five years, and from 14 to 51.3 percent within the first ten years following the initial stroke (7).

In a previous prospective cohort study conducted by Khanevski et al. in Norway, the cumulative incidence of clinical recurrent stroke was 5.4% at 1 year and 11.3% at 5 years (8). A considerably lower incidence was reported in a meta-analysis conducted by Mohan et al. which estimated a pooled cumulative risk of 11.1% at 1 year and 26.4% at 5 years (9).

The varying rates of stroke recurrence, which have been noted in research on temporal patterns of recurrence, might be one explanation for this disparity (10-11). The absolute risk of recurrence has also been significantly reduced by making the best use of secondary preventive techniques. The different definitions of stroke recurrence may also contribute to the discrepancy in reported recurrence rates. Recurrent stroke is defined in a broad variety of ways, from any focal neurological dysfunction lasting longer than 24 hours after an initial stroke to an occurrence happening more than 28 days later (7). Additionally, the frequency of stroke incidents might alter over time due to factors including changes in lifestyle or better alternatives for stroke prevention. Furthermore, studies have demonstrated that stroke rates vary by social position. Therefore, while comparing research, the social structures of the populations should also be taken into account (12).

Previous hypertension at the index stroke was the best predictor of recurrence in our research. In this investigation, 69(82.1%) individuals disclosed a personal history of hypertension. Although hypertension is typically regarded as the single biggest risk factor for having a first stroke, its impact on the likelihood of a recurrence is unclear. While other research revealed that diabetes, coronary heart disease, and atrial fibrillation were the main risk factors, other studies have documented this relation (13-14). Both of them did not differ between patients with and without recurrence, and neither of them was independently related with recurrence in our analysis.

The link between smoking and tobacco uses and stroke recurrence is still debatable. In the current investigation, smoking was reported by 27 (32.1

percent) patients with recurrent strokes, and tobacco use was discovered in 8 (9.5 percent) of these patients. In the Framingham Heart Study, quitting smoking was linked to a significantly lower risk of cardiovascular disease in heavy smokers within 5 years compared to current smokers; however, compared to never smokers, the risk of cardiovascular disease in former smokers remained significantly elevated beyond 5 years after quitting smoking (15).

Although heavy alcohol drinking is an established risk factor for stroke, it is uncertain if drinking increases the likelihood of having another stroke (16-17). In one research, alcohol use independently predicted disability 2 years after stroke, whereas other investigations showed no correlation between alcohol use and functional results (18-21). In our study, alcohol consumption was reported in 29 (34.5%) patients of recurrent stroke. Alcohol intake was found to be an independent risk factor for recurrence in the Han et al. research, both in the general population and among older stroke patients 1 and 5 years after the original stroke (7).

According to a number of researches, diabetes mellitus is a significant predictor of recurrent stroke (22-24). In the study by Han et al., individuals under 65 years old and the entire study group both showed a substantial correlation between diabetes mellitus and stroke recurrence (7). Consistent with these studies, diabetes mellitus was encountered in 45 (53.57%) patients in our study.

According to a research by Han et al., individuals under the age of 65 had a more than twofold increased chance of having another stroke within first year (7). According to a prior study from northern Sweden, the chance of having another stroke increased by 3% for each extra year of age (25). In a Middle Eastern research, a similar pattern was noted, with a 2 percent risk increase seen for each additional year of age (26). Another study found that individuals over 75 years of age had a considerably higher chance of recurrence than those under 65; this risk rose by 13% for patients between the ages of 76 and 85 and by 16% for those over 85 (27). However, in present study, the mean age of the patients having recurrent stroke was 63.51 ± 13.31 years.

Inconsistencies have also been noted in reports of sex-based variations in stroke outcomes. Women experience poorer outcomes than males do, with higher rates of functional impairment, death, recurrence, and reliance three and twelve months after a stroke, respectively (28-30). However, similar sex-based disparities have not been documented in other investigations (31). In our study, recurrent stroke was occurred in 54 (64.3%) of male and 30 (35.7%) of female patients which in consistent with the finding of previous study by Han et al. that reported a higher risk of recurrence among men than among women within the 5-year period after the incident stroke (7).

Our sample comprised individuals with a history of stroke and we examined a general hospital-based stroke population for recurrence, making the findings applicable to clinical practise. We decided to include patients who had already experienced a stroke at the index stroke in this analysis even though some studies utilise the idea of "first stroke" as an index event. In both previous and recurrent stroke, ischemic stroke was found in 52 (61.9%) cases and hemorrhagic stroke was found in 6 (7.14%) cases. 4 (4.76%) patients are those who have ischemic stroke previously and hemorrhagic recurrent stroke. Another 4 (4.76%) patients are those who have hemorrhagic stroke previously and ischemic recurrent stroke. Another 4 (4.76%) patients are those who have hemorrhagic stroke previously and ischemic recurrent stroke.

Our study has limitations. First, we may have estimated the proportion of recurrent stroke among total cases of who were presented with stroke at the hospital. The incidence and prevalence of stroke in general population is still need to be studied. Furthermore, we have scarce data on cause of death, which limits the interpretation of factors affecting mortality. Finally, due to small sample size, the results of

present study cannot be generalized to other demographics.

The primary benefit of this study is the high-quality mortality and recurrence data we were able to collect over a one-year period from a hospital-based stroke cohort. In contrast to studies employing administrative data, a specified investigative process was employed to identify recurrent strokes, providing precise and reliable clinical data on both the index event and the recurrent episode. Imaging scans were used to confirm all ischemic stroke patients.

Conclusion

The prevalence of recurrent stroke was 25.8%. Among risk factors, alcohol consumption was reported in 34.5% of recurrent cases, smoking reported in 32.1% cases, tobacco use found in 9.5% cases, diabetes mellitus occurred in 53.57% cases and hypertension encountered in 82.1% patients. The cause of recurrence involved patient related factors in 75% cases, drug related factors in 2.4% cases and disease related factors in 45.2% cases.

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