Original Research Article

Risk Factors and Outcome of Recurrent Ischemic Stroke: A Prospective Study

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Abstract:

Background: Due to the progressive rise in life expectancy, ischemic stroke-related mortality and morbidity are steadily rising globally. Numerous investigations were conducted in the past to determine the causes of ischemic stroke. However, information on the causes of recurrent ischemic stroke was scarce. Therefore, to decrease the mortality and morbidity from recurrent ischemic stroke, it is time-consuming to identify those risk factors. The study's goal was to ascertain the frequency of ischemic stroke recurrences after a year of discharge from the hospital following a first-ever stroke.

Methods: 75 patients with their first-ever ischemic stroke who were hospitalised to the Department of Medicine, JLNMCH, Bhagalpur, Bihar, participated in this prospective study. For a year, patients' mRS were assessed three times per month. Recurrence was defined as a sudden beginning mRS worsening above the preceding one within this one-year timeframe.

Results: 15 individuals had a stroke recurrence, including 4 who passed away because of it. Over 75 years old, or 50.0% of the population, had the greatest stroke recurrences. At three months, 16.0% at six months, 17.33% at nine months, and 21.33% at one year, the cumulative risk of recurrence rate was 14.7%. The most frequent risk factors among individuals with recurrent strokes included old age, male sex, hypertension, diabetes, and dyslipidemia.

Conclusion: It was determined that among first-time stroke hospital patients, older male patients with numerous risk factors had a higher rate of recurrent episodes. The worst time for recurrence following the initial stroke was the first three months.

Keywords: Stroke, Recurrence, Risk Factors etc.

Introduction

The second most common cause of mortality worldwide is stroke. Every year, HIV kills roughly five million people, and another 30 are disabled to some degree or another as a result of it.[1] The risk of stroke recurrence, physical and mental

impairment, long-term institutionalisation, and death is considerable for patients who are recuperating from a stroke.[2] The main risk for these individuals is a recurrence of stroke, which is a significant public concern. The annual rates of long-term stroke recurrence range from 4% to 14%.[3,4] The five-year cumulative recurrence rate for atherotrombotic cerebral infarction was 24% for women and 42% for men in the Framingham study[5]. The same ratio of 29% was discovered in the Rochester study[6] with no sex difference.

significance of secondary prevention is shown by the high frequency of recurrence rates. The causes of ischemic stroke are very well understood, while the causes of recurrent stroke are less well understood.[7,8] Although various prospective studies have identified particular risk factors, etiological characteristics, and predictive characteristics for recurrent strokes, the findings are inconsistent and remain debatable.[4,5,9] Age, gender, hypertension, heart conditions, transient ischemic attacks (TIA), atrial fibrillation, diabetes mellitus, hyperlipidemia, alcohol use, and smoking are among the risk variables that have been studied for many years in relation to ischemic stroke

recurrence. However, it is frequently difficult to identify appropriate practises in daily practise due to the conflicting findings on the risk factors of ischemic stroke in various studies. To combat stroke recurrence, clinicians need more precise guideposts.

Material and Methods

From January 2021 to December 2021, the first-ever ischemic stroke patients were admitted to the inpatient medicine department of the Jawaharlal Nehru Medical College and Hospital in Bhagalpur, Bihar. A total of 82 individuals were chosen for the trial, however 4 patients were excluded due to cognitive impairment following a stroke, and another 3 patients were excluded because they refused to cooperate during the study's three-month follow-up. So, a total of 75 patients were examined for recurrence throughout a three-month to one-year period. By comparing the current status to the previous status, all patients are monitored for recurrence using the mRS scale. Any index case mRS scale degradation over the prior value was noted as a recurrence.

Results

Table 1: Distribution of the patients according to Age

Age in years	No. of patients	Recurrence		p-value
		Yes	No	
≤45	6	0(0.0%)	6(100.0%)	
46-55	18	3(16.67%)	15(83.33%)	
56-65	25	5(20.0%)	20(80.0%)	0.041
66-75	20	4(20.0%)	15(75.0%)	
>75	5	3(60.0%)	4(80.0%)	
Total	75	15(20.0%)	60(80.0%)	
Mean±SD		63.99±9.54	59..89±10.97	

According to Table I, the age group with the highest frequency of stroke recurrence was above 75 years old, representing 60.0% of cases, while 80.0% did not occur. However, patients with

ischemic stroke tended to be in the 56–75 age bracket; among them, 20.0% of patients experienced recurrence.

Table 2: Distribution of the patients according to Gender by recurrence

Gender	No. of patients	Recurrence		p-value
		Yes	No	
Male	40	9(22.5%)	31(77.5%)	
Female	35	6(17.14%)	29(82.85%)	0.599
	75	15(20.0%)	60(80.0%)	

Table 2 showed male patient developed more recurrence.

Table 3: Distribution of the patients according to Risk factors by age

Risk Factors	Number of Patients	Age in years					p-value
		≤45	46-55	56-65	66-75	>75	
Hypertension • Yes • No	53 22	4(7.54%) 3(13.63%)	15(28.30%) 4(18.18%)	21(39.62%) 5(22.72%)	11(20.75%) 7(31.81%)	2(3.77%) 3(13.63%)	0.299
Diabetes Mellitus • Yes • No	37 38	3(8.11%) 5(13.15%)	11(29.72%) 6(15.79%)	13(35.14%) 11(28.95%)	7(18.92%) 14(36.84%)	3(8.11%) 2(5.26%)	0.068
Smoking • Yes • No	18 57	1(5.55%) 7(12.28%)	5(27.78%) 13(22.80%)	7(38.88%) 18(31.57%)	3(16.67%) 15(26.31%)	2(11.11%) 4(7.01%)	0.712
Dyslipidemia • Yes • No	34 41	2(5.88%) 6(14.63%)	10(29.41%) 8(19.51%)	11(32.35%) 14(34.14%)	9(26.47%) 10(24.39%)	2(5.88%) 3(7.31%)	0.509
Family History • Yes • No	19 56	2(10.52%) 5(8.9%)	6(31.57%) 11(19.64%)	5(26.31%) 21(37.5%)	5(26.31%) 15(26.79%)	1(5.26%) 4(7.14%)	0.328
Atrial Fibrillation • Yes • No	12 63	1(8.33%) 7(11.11%)	3(25.0%) 14(22.22%)	5(41.67%) 20(31.74%)	1(8.33%) 19(30.16%)	2(16.67%) 3(4.76%)	0.031

Table 3 revealed that the majority of patients had hypertension, followed by diabetes mellitus (DM) and dyslipidemia, however this was not statistically significant across all age groups. Analysis of the combined modifiable risk variables for stroke recurrence revealed no statistically significant influence.

Table 4: Distribution of the patients according to Risk factors by recurrence

Risk Factors	Number of Patients	Recurrence		p-value
		Yes	**No**	
Hypertension				
• Yes	53	11(19.64%)	42(79.25%)	0.631
• No	22	4(18.18%)	18(81.81%)	
Diabetes Mellitus	37	9(24.32%)	28(75.68%)	0.509
• Yes	38	7(18.42%)	31(81.58%)	
• No				
Smoking				
• Yes	18	3(16.67%)	15(83.33%)	0.612
• No	57	12(21.05%)	45(78.95%)	
Dyslipidemia				
• Yes	34	8(23.53%)	26(76.47%)	0.187
• No	41	6(14.63%)	35(85.37%)	
Family History				
• Yes	19	3(15.79%)	16(84.21%)	0.185
• No	56	13(23.21%)	43(76.79%)	
IHD				
• Yes	12	3(25.0%)	9(75.0%)	0.593
• No	63	12(19.04%)	51(80.95%)	

Table IV demonstrated an increased risk of recurrence in index stroke patients who were hypertensive, diabetic, and dyslipidemic, however this was not statistically significant.

Table 5: Distribution of the patients according to multiple Risk factors by recurrence

Risk Factors	Number of Patients	Recurrence		p-value
		Yes	**No**	
No risk factor	8	1(12.5%)	7(87.5%)	0.311
One risk factor	15	3(20.0%)	12(80.0%)	0.599
Two risk factors	18	5(27.78)	13(72.22%)	0.79
Three risk factors	15	4(26.67%)	11(73.33%)	0.578
Four risk factors	14	4(28.57%)	10(71.43%)	0.829
Five risk factors	5	1(20.0%)	4(80.0%)	0.701

Table 6: Distribution of the patients according to recurrence

Recurrence	Number of Patients	Percentage
Yes	15	20.0%
No	60	80.0%

Recurrence of ischemic stroke was 20% after one year follow up.

Table 7: Distribution of the patients according to death

Death	Number of Patients	Percentage
Yes	4	5.33%
No	71	94.7%

Table 8: Distribution of the patients according to cumulative recurrence

Recurrence	Number of Patients	Percentage
Three months	11	14.7%
Six months	12	16.0%
Nine months	13	17.33%
Twelve months	16	21.33%

Discussion

This study calculated the likelihood of stroke recurrence with numerous risk factors up to a year after the original ischemic stroke. The findings showed that 20% of the patients had experienced an ischemic stroke recurrence during the one-year follow-up period, and additionally, 5.33% of patients passed away as a result of the recurrence. According to this study, there was a cumulative probability of recurrence at 3 months, 6 months, 9 months, and 1 year of 14.7%, 16.0%, 17.33%, and 21.33%, respectively. In other studies, the rate of stroke recurrence within the first three months varied. According to a Japanese study, the figure was 4.9%.[10] 7.4% of cases recurred within 3 months, according to the American Heart Association [11].

This study revealed a higher recurrence rate than other studies. Most likely as a result of the study inclusion of more elderly participants. In numerous studies, the annual incidence of stroke recurrence at one year is diverse, ranging from 11.91% in China to 17.7% in the Oxfordshire Community Stroke Project[13].South Carolina has 8%, Perth, Western Australia, 4%, and Perth, Australia, 4%. This study found that it was 20%, which was slightly more than other studies. 4 patients (5.3%) in this research died. 26.7% of cases ended in death. According to one study, the case fatality rate was 20.1%. Additionally, this is very comparable to earlier studies.

At the time of the stroke, the average age was 64.80±9.48 years. Although individuals with ischemic stroke tended to be in the 56–75 age range, 20.0% of these patients experienced recurrence. The age group of patients > 75 years old accounted for 60.0% of those who experienced a recurrence of stroke. Statistics did not support its significance. Stroke recurrence occurred in 22.5% of male patients, but in only 17.14% of female patients, which was similarly not statistically significant. The Framingham Study found a similar pattern of stroke recurrence in men, but not in other trials. At the time of enrolment for these 75 stroke patients, the profile of the five modifiable risk variables was examined. Only 8 patients (10.66%) lacked any of the aforementioned five risk factors. The remainder were 15 (20.0%) patients who had just one risk factor, 18 (24.0%) who had two, 15 (20%) who had three, 14 (18.66%) who had four, and 5 (6.66%) who had all five risk factors.

Two risk factors (hypertension and diabetes mellitus) have affected 24.0% of individuals with recurrent strokes. In this study, hypertension was present in the majority of patients with stroke. An earlier investigation revealed hypertension (HTN) was linked to an increased risk of stroke recurrence. DM was the second most common risk factor in this study, and it also appeared in the Lehigh Valley Study, but it was not discovered in Chicago, Maryland, or Boston utilising the Stroke Data Bank. A little over half of people who have had strokes have DM.

34 patients, or 45.33 percent of the total 75 patients, had dyslipidemia. 8 of them (or 23.53%) have had a stroke again. According to a prior study, 56% of individuals with recurrent strokes had dyslipidaemia.[17] In this study, 18 patients (24.0%) smoked. Three (16.67%) of them experienced stroke recurrences. According

to one study, 9.5% of smokers experienced a stroke recurrence.[18]

19 participants in this study have first-degree relatives who have had a stroke. 3 of them (15.79%) experienced recurrence. According to one study, 6.2% had a family history.[19] Twelve of the 75 index stroke patients have arrhythmia. Three individuals (25% of the total) experienced recurrent stroke episodes. According to one study, only 5% of individuals who experienced a stroke recurrence within a year had arrhythmia.[20] Only AF, which affected 16% of patients, emerged as a significant predictor for stroke recurrence in the LVRSS Cox modelling study of the cardiac disorders investigated.[21]

Conclusion

Multiple risk factors and advanced age increased the chance of ischemic stroke recurrence. After an initial stroke, the first three months were the worst for recurrence.

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