Original Research Article

Evaluation of Risk Factors in Patients with Ischaemic Stroke

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Abstract

Background and objectives: Stroke is a significant public health issue; it is the second biggest cause of death in the world, behind heart disease, and the main cause of long-term impairment. The therapy of people with ischemic stroke is still ineffective, and stroke prevention is a preferable choice. Controlling risk factors can help to lower the occurrence of stroke. The purpose of this study is to evaluate the most prevalent risk variables in patients with ischemic stroke, as well as their prognosis. It attempts to aid in the treatment of these risk factors in order to lower the incidence of stroke in the general population. **Methods:** A comprehensive clinical history, extensive physical examination, and appropriate investigations were performed on 50 patients with ischemic stroke who met the inclusion criteria. Their prognosis was also evaluated throughout their hospital stay. **Results:** At the conclusion of the study, it was revealed that the incidence of stroke in males was 60 percent of stroke in people over the age of 60. The most common risk variables were smoking (46.0%), hypertension (40.0%), dyslipidemia (18.0%), alcohol use (16.0%), diabetes mellitus (12.0%), cardiac disorders (14.0%), tobacco chewing (8.0%), recent delivery history (2.0%), and a family history of stroke (2 percent). It was also shown that 72.3 percent of patients had multiple risk factors, of which 7.2 percent recovered completely, whereas 25.0 percent of patients with single risk factors recovered completely.**Conclusion:** Stroke have been shown to be more common in men than in women, and higher age (>60 years) was related with an increased risk of stroke. Smoking, hypertension, dyslipidemia, alcohol intake, and diabetes mellitus were the most frequent modifiable risk factors. Increasing age, male sex, and a family history of stroke were the most common non-modifiable risk variables. The amount of risk variables present influences the prognosis. It was also observed that greater age, hyperglycemia, and a number of risk variables were associated to a worse prognosis.Stroke have been shown to be more common in men than in women, and higher age (>60 years) was related with an increased risk of stroke. Smoking, hypertension, dyslipidemia, alcohol intake, and diabetes mellitus were the most frequent modifiable risk factors. Increasing age, male sex, and a family history of stroke were the most common non-modifiable risk variables. The amount of risk variables present influences the prognosis. It was also observed that greater age, hyperglycemia, and a number of risk variables were associated to a worse prognosis.

Keywords: hypertension, dyslipidaemia, alcohol intake, **s**troke; risk factors; prognosis.

Introduction

Stroke is second to heart disease as a worldwide cause of death. In the United States, stroke is the third most common cause of death, following heart disease and cancer. Annually, 150,000 Americans die of stroke, and it contributes to the death of another 140,000 people. [1]For India, community survey has shown a crude prevalence rate for hemiplegia in the range of 200 per 100000 persons, nearly 1.5 percent of all urban hospital admission, 4.5% of all medical and around 20% of all neurological cases. [2]

Since the late 1990s, there has been an increase in survival after stroke and, therefore, it has become a common cause of human suffering and the leading cause of long-term disability. A stroke often precludes patients' abilities to return to work or to regain their role in a family. Thus, by affecting both patients and loved ones, stroke is a family illness. Family relationships and dynamics often are changed irrevocably. Disability may require a spouse or other relative to assume a new role or become a full-time caregiver. Stroke is second only to dementia as a neurological disorder leading to long term institutionalized care. Recurrent stroke produces dementia, and its effects exacerbate cognitive impairments from degenerative dementias, such as Alzheimer's disease. [1]

Due to the high incidence of stroke and the high costs expended for each individual patient, it accounts for a sizeable amount of the health care costs. Thus, stroke and its sequelae are important issues for health care planners in governments, insurance companies, and medical services everywhere. Because the costs of treatment and the economic consequences of lost productivity are so great, prevention of stroke will be a very cost-effective strategy. [1]

A stroke is rapidly developing clinical symptoms and / or signs of focal, and at times global (applied to patients in deep coma and to those with SAH) loss of brain function with symptoms lasting more than 24 hrs or leading to death, with no apparent cause other than that of vascular origin. [3]

Thus, the definition of stroke is clinical and laboratory studies including brain imaging are used to support the diagnosis. The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature. [4]

Objectives

1. To evaluate the risk factors in patients with ischemic stroke.

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2. To find out the prognosis of ischaemic stroke with reference to risk factors.
3. To identify the patients having modifiable risk factors so that preventive care can be taken to improve the prognosis and prevent recurrences.

Material and Methods

The present study included patients with ischaemic stroke who were admitted in the intensive care unit under the Department of Medicine at Gandhi Hospital during the period (Sep 2020 – October 2021). Informed consent was taken before enrolment. Sixty five patients were enrolled for the study. The criteria for selection of patients were as follows:

Inclusion criteria

Patients with the evidence of ischaemic stroke.

Ischaemic stroke is diagnosed if the following criteria are present:

1. Symptoms and signs suggestive of acute loss of focal or global cerebral function.
2. Evidence of ischaemia on CT scan of head.

Exclusion criteria

1. Patients with focal epilepsy, migraine, and structural brain lesions (such as tumors).
2. Patients with evidence of haemorrhage on CT scan of head.
3. Stroke secondary to infection and connective tissue disorders.

Only the patients who met the above inclusion criteria and did not have any exclusion criteria were included in the study.

The patients enrolled in the study were subjected to a detailed clinical history and physical examination. Clinical history was obtained from the attenders when the patient was having speech disturbances. The following investigations were carried out as part of the study.

- Complete blood count.
- Urine analysis
- Fasting blood sugar / post prandial blood sugar.
- Blood urea.
- Serum creatinine
- Lipid profile
- Electro cardiogram (ECG)
- 2D-Echo with colour doppler
- Computed Tomography (CT Scan)

The prognosis was studied with regard to the outcome during the Hospital stay and was classified as follows :

- Complete recovery
- Partial recovery
- No recovery (No improvement)
- Death

The risk factor profile of each patient was evaluated during the stay. In the study

- Hypertension was defined as a BP recording of >140/90 mmHg on 3 separate occasions, taken on 3 different days. Patients who are already on antihypertensive medications were also taken as hypertensive.
- Dyslipidemia was taken as serum cholesterol >200mg/dl, LDL cholesterol >130mg/dl and HDL cholesterol <35mg/dl in females and <40mg/dl in males.
- Patients were included as suffering from heart diseases if they had ischemic heart disease, congestive heart failure, rheumatic heart disease, atrial fibrillation or evidence of left ventricular hypertrophy on ECG or Echocardiography.
- Smoking, tobacco chewing and alcohol intake were based on the clinical history of past and present consumption of these substances.
- Diabetic patients were diagnosed as per the American diabetic association guidelines. Patients on antidiabetic medications were also considered as diabetics.
- A family history of stroke was entertained if the first-degree relatives of the patients suffered from stroke.
- Patients were considered as obese if their BMI was - 30.

Results

In the present study 50 cases of acute ischaemic stroke who met inclusion and exclusion criteria were analyzed with regards to the risk factors, individually and in combination and they were correlated with the outcome.

Sex

Table 1: Sex Distribution

	Total	Expired	Complete Recovery	Partial Recovery	No Recovery
Male	32 (64.0%)	4(9.52%)	5(15.6%)	12 (37.5%)	12 (37.5%)
Female	18 (36.0 %)	2(11.11%)	3 (16.66%)	3 (27.7 %)	8 (44.44%)

Among 50 patients, 32 (64.0%) were males and 18 (41.54%) were females.

In the 32 male patients, 3 patients (9.37 %) expired, 5 patients (15.78 %) had complete recovery, 12 patients (31.5 %) had partial recovery and 12 (37.5%) had no recovery.

In the 18 female patients, 2 patients (11.11%) expired, 3 patients (16.66%) had complete recovery, 5 patients (27.7 %) had partial recovery and 8 patients (44.44%) had no recovery.

Table 2: Age Distribution

Age in years	Total	Expired	Complete Recovery	Partial Recovery	No Recovery
20-29	4 (8 %)	0	2 (20%)	1 (25%)	1 (25%)
30-39	5 (9.23%)	0	1 (20 %)	3 (60.0 %)	1 (20 %)
40-49	7 (14%)	2 (28.57%)	1 (14.28 %)	2 (28.57%)	2 (33.33%)
50-59	10 (5 .0%)	1 (10.0 %)	1 (10 %)	3 (70 %)	1 (10%)
60-69	17 (34.0%)	2 (11.7%)	3 (17.64%)	4 (36.36%)	7 (47.0%)
< 70 yrs	7 (14%)	2 (17.6 %)	0	2 (18.18%)	5 (63.63 %)

The patients were grouped into the following age groups. 20-29 years, 30-39 years, 40-49 years, 50-59 years, 60-69 years and more than 70 years.4 patients (6.15%) were between 20-29 years of age, 6 patients (9.23%) were between 30-39 years of age, 9 patients (30.84%) were between 40-49, 13 patients (20%) were between 50-59 years, 22 patients (33.85%) were between 60-69 years and 11 patients (16.92%) were more than 70 years.

In 20-29 years age group, one patient (8 %) had no recovery and 2 patients (50%) had complete recovery, no death occurred in this age group.

In 30-39 years age groups, 5 patients (10.0 %) had partial recovery and one patient (2 %) had complete recovery and one patient did not recover.In 40-49 years age group, 2 patient (28.57 %) had no recovery and partial recovery was seen in 2 other patients (33.33%). One patient (11.11%) had complete recovery and 2 patients (22.22%) expired.In 50-59 age group, 1 patient (10 %) had complete recovery and 1 patient expired. 3 patients (70.0%) had partial recovery and 1 patients (10.0%) had no recovery.

In 60-69 age group, 2 patients (11.76 %) expired. 3 patients (36.36 %) had completed recovery, 4 patients (47.17%) had partial recovery, and 8 patients (47.0%) had no recovery.

In the age group more than 70 years, 2 patients (17.6%) expired, 2 patients (18.18 %) had partial recovery and 4 patients (63.63 %) had no recovery.

Risk factors observed in ischaemic stroke patients.

Table 3: Risk factors observed in ischaemic stroke patients

Risk factors	No. of patients	Percentage
Hypertension	20	40
Diabetes mellitus	06	12.0
Smoking	23	46.0
Tobacco chewing	04	8.0
Dyslipidemia	09	18.0
Alcohol	08	16
Heart diseases	07	14
History of Recent delivery	01	02
Family history stroke	01	02

Among 50 patients 20(40.0 %) patients had hypertension, 23 patients(46%) were smokers, 4 patients (8.0 %) chewed tobacco, 9 patients (18.%) had dyslipidemia, 6 Patients (12.0 %) had diabetes mellitus, 8 patients (16%) had alcoholism, 7 patients (14.0 %) had heart diseases 1 patient (2.0 %) had recent delivery and 1 patient (2.0 %) had family history of stroke.

Table 4: Hypertension

	Total		Expired		Comple te Recover y		Partial Recovery		No Recovery	
	No.	%	No.	%	No.	%	No.	%	No.	%
No. of cases with history of hypertension	20	40	2	10	2	10	11	50	7	35
No. of cases without history of hypertension	30	60	3	6	4	8	12	40	11	22

Out of 50 patients 20 patients (40.0 %) had history of hypertension. Among 20 patients who presented with hypertension 2 patients (10%) expired, 10 patients (50 %) had partial recovery, 2 patients (10 %) had complete recovery and 7 patients (35 %) had no recovery.30 patients who did not gave history of hypertension, 3 patients (10 %) expired, 4 patients (20%) had complete recovery, 12 patient (40 %) partial and 11 patients (36%) had no recovery.

Table 5: Diabetes mellitus

	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No.	%	No.	%	No.	%	No.	%
No. of cases with diabetes	6	2	33.3	0	0	1	16.66	3	50
No. of cases without diabetes	44	5	11.36	7	15.9	18	40.0	14	31.8

Out of 50 patients 6(12 %) had diabetes mellitus. Among 6 patients 2 (32.22%) expired, complete recovery was not noted in this category of patients. 1 (16.66 %) patients had partial recovery and 3 (50.0 %) had no recovery.

Among 44 patients who were non-diabetes, 5 (11.36 %) patients expired, 7(15.9 %) had complete recovery, 18 patients (40.0 %) had partial recovery and 14 patients (31.8 %) had no recovery.

Table 6: Smoking

	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No.	%	No.	%	No.	%	No.	%
Smokers	23	2	6	3	13.0	9	39.0	9	39.9
Non Smokers	27	3	11	2	7.4	8	29.0	12	44

Out of 50 patients, 23 patients (60.0 %) were smokers. Among these 23 patients, 2 patients (4.7%) expired, 3 patients (6.0 %) had complete recovery, 9 patients (18.0 %) had partial recovery and 3 patients (39.9 %) had no recovery.

In 27 patients who were non-smokers, 3 patients (11.14 %) expired, 2 patients (7.4 %) had complete recovery, 8 patients (29.0 %) had partial recovery and 12 patients (44%) had no recovery.

Table 7: Tobacco chewing

	Total		Expired		Complete Recovery		Partial Recovery		No Recovery	
	No.	%	No.	%	No.	%	No.	%	No.	%
Tobacco hewers	4	8	0	0	0	0	3	33.33	2	44.44
No chewers	41	82.0	3	7.31	6	14.6	17	41.4	15	36.5

Among 50 patients, 4 patients (8.0 %) gave history of tobacco chewing. Among them 3 patients (7.5 %) had partial recovery and 2 patients (25.0 %) had no recovery. Among 46non-tobacco chewers, 5(10.0 %) had complete recovery, 16 (34.7 %) had partial recovery, 21 (37.29%) had no recovery and 4 patients (8.6%) expired.

Table 8: Dyslipidemia

	Total		Expired		Complete Recovery		Partial Recovery		No Recovery	
	No.	%	No.	%	No.	%	No.	%	No.	%
No. of cases with Dyslipide mia	9	18	2	22.2	0	0	3	33.3	4	44.4
No. of cases without Dyslipide mia	41	82	3	7.31	6	14.6	17	41.4	15	36.5

Among 50 patients, 9 patients (18.0%) had dyslipidemia. Among these patients 2 patients (22.2%) expired, 3 patients (33.33%) had partial recovery and 4 patients (44.4 %) had no recovery. Complete recovery was not noted in any of them.

Out of 50 patients, 41 patients did not show dyslipidemia. Among these patients, 6 patients (14.6
%) had complete recovery, 17 patients (41.6 %) had partial recovery and 15patients (36.53%) had no recovery. 3 patients (7.31 %) expired in this group.

Alcohol

8 patients gave history of alcohol consumption. Among 8 patients (16.0 %), 1 patient (12.5%)
expired, 1 patients (12.5 %) had complete recovery, 4 patients (50%) had partial recovery and 2 patients (25%) had no recovery.

Table 9: Alcohol consumption

	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No.	%	No.	%	No.	%	No.	%
No. of cases with Alcohol consumption	8	1	12.5	1	12.5	4	50	2	25
No. of cases without Alcohol consumption	42	5	11.9	4	9.5	14	33.3	19	45.2

Out of 50 patients, 42 patients were non-alcoholic. In this group 5 patients (11.9%) had complete recovery, 14 patients (33.3 %) had partial recovery and 19 patients (45.23%) had no recovery. 4 patients (11.9%) expired in this group.

Table 10: Heart Diseases

.	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No	%	No.	%	No.	%	No.	%
No. of cases with heart diseases	5	1	20	1	20	3	60	0	0
No. of cases without heart diseases	45	4	8.8	6	13.33	18	40	17	37.7

Among 50 patients, 5 patients had heart diseases (20%) which consisted of AF, valvular heart disease (RHD), IHD, LVH. Among them 1patients (20 %) expired, 1 patient (20%) had complete recovery and 3 patients (60%) had partial recovery.

45 patients were without any heart disease, in this group, 6 patients (13.3%) had complete recovery, 18 patients (40 %) had partial recovery and 17 patients (37.7 %) had no recovery. 4 patients (8.8%) expired in the group.

Table 11: History of recent delivery

	Total	Expired		Complete Recovery		Partial Recovery		No Recover y	
		No.	%	No.	%	No.	%	No.	%
No. of cases with History of Recent delivery	1	0	0	1	100	0	0	0	0

Out of 18 female patients, 1 patient (5.5%) gave history of recent delivery. She had a complete recovery.

Family history of stroke

Table 12: Family history of stroke

	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No.	%	No.	%	No.	%	No.	%
No. of cases with family history of stroke	1	0	0	0	0	0	0	1	100

Out of the 50 patients, 1 patient (2%) gave a family history of stroke. No recovery was seen in that patient.

Table 13: Multiple risk factors and its outcome

	Total	Expired		Complete Recovery		Partial Recovery		No Recovery	
		No.	%	No.	%	No.	%	No.	%
No. of cases with risk factors >1	28	4	14.2	2	7.14	12	42.8	10	35
No. of cases 1 risk factors	12	2	16.6	3	25	3	25	4	33.3

Among 50patients, 28 patients (56.0%) had multiple risk factors like age > 60 years, hypertension, smoking, diabetes etc. among these, 4 patients (14.2%) expired, 10 patients (35.0 %) had no recovery, 12patients (42.0%) had partial recovery and 2 patients (7.14%) had complete recovery.

Among the 12 patients (24 %) who had one or no risk factors 2 patients (16.6%) expired, 3 patients (25.0 %) had complete recovery, 3 patients (25 %) had partial recovery and 4 patients (50 %) had no recovery.

Table 14: Clinical presentation of ischaemic stroke

Symptoms	No. of patients	Percentage
Unconsciousness	7	14
Motor weakness	38	76
Sensory disturbance	0	0
Speech disturbance	14	28
Headache	6	12
Vomiting	2	4
Convulsions	1	2
Fever	0	0

When the all 50 patients were analysed with respect to clinical presentation, motor weakness was most common manifestation being present in 38 patients (i.e., 76 %). Speech disturbance was next frequent presentation found in 14 patients (28.0 %). Unconsciousness and headache followed being in 7and 6patients respectively. Vomiting and convulsions present in 2 patients each. None of the patients in this series presented with sensory disturbance.

Discussion

Stroke especially ischaemic is a common clinical problem; current treatment for patients with established stroke is relatively ineffective. Approximately 50% of patients are left with permanent disability. Effective risk factor intervention offers a real hope of reducing stroke morbidity and mortality. Certain risk factors have been consistently

identified as significant predictor of stroke outcome, while some are less consistent.

In the present study which involved 65 patients of ischaemic stroke admitted in the ICU attached to our institute, we examined the prediction of stroke outcome in relation to sex, age, smoking, tobacco chewing, hypertension, heart disease (valvular heart diseases, coronary artery diseases, atrial fibrillation etc), diabetes, dyslipidemia and obesity. It was consistent with previous published studies, smoking, hypertension and dyslipidemia were the most common risk factors.

Sex

In present study ischaemic stroke is predominant in males 32 (58.0%) this is consistent with Bogoussalvsky [5] study and P.M. Dalal study. [6]

Age

In the present study 24patients (48%) were aged above 60 years and 3 patients (57%) who expired were from this group. This is consistent with the A.G. Shaper, A.N. Philips study.

Hypertension

In the present study 25 patients (38.46%) were hypertensives. This was low when compared to the Bansal [8] study and Feigin [2] study but was consistent with the Sridharan[19] study.

Diabetes mellitus

6patients (12 %) were diabetics in the present study and this was consistent with the Feigin study. [2]

Smoking

23 patients (46%) included in this study were smokers, this was higher when compared to the other studies like Bansal [8] study, Feigin, [2] Sridharan [9] study.

Tobacco chewing

4 patients (8.0 %) chewed tobacco in the present study. This was consistent with the Bansal study. [8]

Dyslipidemia

In the present study 9 patients (18.0%) were suffering from dyslipidemia this was higher when compared with the Bansal study.[57]

Alcohol consumption

8 patients (16 %) were alcoholic and this was consistent with the Bansal study.[57] Heart disease

7 patients (14 %) suffered from heart ailments in the present study. This was much lower when compared to Bansal study, [8] Feigin, [2] and Shridharan [9] study.

Family history of stroke

1 patient (2.0 %) had a family history stroke in the present study, this was much lower than the Bansal study [8]and Feigin [2] study.

Obesity has been much less significant risk factor in the present study, which is consistent with Davia Rastenyte study. [11]

Prognosis

Hyperglycemia is an adverse prognostic factor. In the present study of the 6 diabetic patients there are 2 diabetic patients (33.33%) who had no recovery, 4 patients (66.66%) had partial recovery. This was consistent with Copenhagen stroke study. [12]

Age was also a negative prognostic factor, with 6 patients (40%) in the age range 60-69 years and 2 patients (33.33%) in the age group >70 years not recovering. This is compatible with the research of A.G. Shaper, A.N. Philips, and others. [7] In the current investigation, 28 patients (48%) had several risk factors, and they had a higher morbidity than the 12 patients (24%) who had a single risk factor (complete recovery 22.22 percent). This was similar with the findings of the Bogousslavsky, [13] Feigin, [2], and Bansal [8] studies.

During a hospital stay, the prognosis.

Increasing age was also an unfavourable prognostic factor, with 6 patients (40%) in the age range 60-69 years and 2 patients (33.33%) in the age group >70 years not recovering. This is congruent with the research of A.G. Shaper, A.N. Philips, and colleagues.[7] In the current investigation, 28 patients (48%) were connected with numerous risk factors, and they had a higher morbidity than the 12 patients (24%) who had a single risk factor (complete recovery 22.22 percent). This was consistent with the Bogousslavsky, [13] Feigin [2], and Bansal [8] investigation.

Conclusion

- Hypertension, smoking, dyslipidemia, drinking habits, and diabetes mellitus are the most common modifiable risk factors in ischemic stroke.
- Increased age, male sex, and a family history of stroke are the most common non- modifiable risk factors.
- The amount of risk variables present influences the prognosis. Multiple risk factors are linked to an even worse prognosis.
- Age and hyperglycemia are also connected with a worse outcome.
- Modifiable risk factor treatment or prevention can minimise stroke mortality and morbidity.

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