International Journal of Medical and Health Research
ISSN: 2454-9142
Impact Factor: RJIF 5.54
www.medicalsciencejournal.com
Volume 3; Issue 11; November 2017; Page No. 99-101

A study on risk factors of patients with acute ischemic stroke at a tertiary care hospital

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Abstract
Introduction: Large vessel intracranial atherosclerosis is the commonest cause of ischemic stroke in India. Only a small number of ischemic stroke cases are able to have the benefit of thrombolytic therapy. Presently, prevention of stroke is the best option considering the Indian scenario through control and/or avoiding risk factors of stroke.
Methodology: Patients satisfying inclusion criteria are enrolled within 24 hours of admission after informed consent.100 cases satisfying inclusion criteria was included. Data was collected using a pretested proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations will be undertaken.
Results: In our study, it is observed that hypertension which is the major risk factor for acute ischemic stroke was present in 79 % of patients. Hypertension present in 73% of males & 89% of females. Nearly 60% of males were smokers and alcoholics in the study population.
Conclusion: Risk factors like diabetes and dyslipidemia were present in 32% & 8% of the study population respectively.

Keywords: intracranial atherosclerosis, risk factors, acute ischemic stroke

Introduction

India like other developing countries is in *the midst of a stroke epidemic* [1]. In contrast to industrialized Western countries where there has been a steady decline in stroke over the past 30 years, India is currently facing the challenge of a high stroke incidence [2]. The major reason is that the common risk factors of stroke, namely, hypertension, diabetes, smoking, and dyslipidemia are not being adequately controlled. Public awareness in this regard is still quite poor in our society. Cardiovascular disease including stroke, which comprised 19% of death in India in 2001-2003, is estimated to rise to 36% by 2030. On 4th January 2008, the Ministry of Health has launched the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), which includes development of public awareness and improvement of logistic facilities right from the grass root level to deal with the various non-communicable diseases. The program, if implemented successfully, will achieve the WHO target of 25% reduction in cardiovascular disease and stroke by the year 2025 [3, 4].

Large vessel intracranial atherosclerosis is the commonest cause of ischemic stroke in India. Only a small number of ischemic stroke cases are able to have the benefit of thrombolytic therapy. Presently, prevention of stroke is the best option considering the Indian scenario through control and/or avoiding risk factors of stroke [5].

Age is the single most important risk factor for stroke. For each successive 10 years after age 55, the stroke rate more than doubles in both men and women. It is assumed that the average age of patients with stroke in developing countries is usually 15 years younger than those in developed countries. In India, nearly one-fifth of patients with first-ever stroke admitted to hospitals has been estimated to be aged 40 years or less admitted to hospitals has been estimated to be aged 40 years or less. But the Mumbai and Trivandrum registries showed that the mean age of patients with stroke was 66 and 67 years respectively. In contrast, in the Bangalore study the mean age of stroke was observed as 54.5 years [6].

Men are more likely to have a stroke than women, sex ratio for India is 7:1. This may be due to differences in risk factors such as smoking and drinking which are more prevalent among men in India compared with women. A higher global incidence of ischemic but not hemorrhagic stroke is reported men than in women. The incidence rate in women has significantly decreased between 1990 and 2013, but in men the decrease was not significant [7].

Methodology

The study was conducted on admitted patients with first attack of Acute Ischemic stroke to Medicine ward in the Medical College Hospital. Patients satisfying inclusion criteria are enrolled within 24 hours of admission after informed consent.100 cases satisfying inclusion criteria was included. Data was collected using a pretested proforma meeting the objectives of the study. Detailed history, physical examination and necessary investigations will be undertaken. The purpose of the study was explained to the patient and informed consent obtained. Clinical history was taken from either the patient or his/ her relatives or attendant. While taking history, importance was given regarding presence or absence of vomiting, headache and convulsions. Past history of HTN, DM, CAD, RHD, TIA, collagen diseases, meningitis, tuberculosis, endocrine disorders and congenital disorders were taken. Personal history regarding dietary habits, smoking, alcohol consumption and tobacco chewing were noted. NIH stroke scale was used in all patients to assess the

neurological disability and Barthel index used to assess prognosis at discharge.

Results

Table 1: Presenting Risk Factor Distribution in Study Population

Risk Factor	No	Male %	No	Female %	No	Total %
Hypertension	46	73%	33	89%	79	79%
DM	20	32%	12	32%	32	32%
Dyslipidemia	10	16%	8	22%	18	18%
Smoking	38	60%	0	0%	38	38%
Alcoholism	39	62%	0	0%	39	39%

In our study, it is observed that hypertension which is the major risk factor for acute ischemic stroke was present in 79 % of patients.

Hypertension present in 73% of males & 89% of females

Nearly 60% of males were smokers and alcoholics in the study population.

None of the women in our study had indulgence in alcohol or tobacco usage.

Risk factors like diabetes and dyslipidemia were present in 32% & 8% of the study population respectively.

Table 2: HTN Distribution

Overall distribution	Number of patients	Percentage of patients
No	21	21%
Yes	79	79%

Of the 100 patients in the study, nearly 80 % of the study group were hypertensive.

This reinforces hypertension as the major risk factor for acute ischemic stroke

Table 3: Distribution According to BP on Admission

Blood pressure	Gender		Total
	Male (n=63)	Female (n=37)	(n=100)
SBP (mm Hg)			
<120	0(0%)	0(0%)	0(0%)
120-140	11(17.5%)	7(18.9%)	18(18%)
>140	52(82.5%)	34(91.9%)	89(89%)
DBP (mm Hg)			
<80	6(9.5%)	5(13.5%)	11(11%)
80-100	55(87.3%)	29(78.4%)	84(84%)
>100	2(3.2%)	3(8.1%)	5(5%)

Nearly 90 % had SBP of > 140 at admission; None of the patient had BP < 120 at admission. 84 % of patients had recorded DBP between, 80-100.

Table 4: BMI (kg/m^2) Distribution of Patients Studied

BMI (kg/m^2)	Gender		Total
	Male	Female	
<18.5	0(0%)	0(0%)	0(0%)
18.5-25	31(49.2%)	12(32.4%)	43(43%)
25-30	27(42.9%)	19(51.4%)	46(46%)
>30	5(7.9%)	6(16.2%)	11(11%)
Total	63(100%)	37(100%)	100(100%)
Mean ± SD	25.57±2.94	26.53±3.48	25.92±3.17

46 % of patients in the study were overweight.

Discussion

Stroke is the leading cause of disability worldwide, the second most common cause of dementia and the third leading cause of death [8].

Cerebral infarction basically comprises two pathophysiologic processes:

1. Loss in the supply of oxygen and glucose secondary to vascular occlusion.
2. Array of cellular metabolism consequent to the collapse of energy producing processes ultimately with disintegration of cell membranes.

As the brain receives 20% of the cardiac output at rest, it is exquisitely sensitive to ischemia, such that even brief ischemic periods to neurons can trigger a complex sequence of events that may result in permanent cerebral damage [9].

Ischemic stroke may manifest in the form of thrombotic stroke (large vessel and small vessel types); embolic stroke (with/without known cardiac and/or arterial factor); systemic hypoperfusion (Watershed or Border Zone stroke); or venous thrombosis.

Irrespective of the cause, compromised vascular supply to the brain is the primary event in majority (85–90%) of acute strokes. Low respiratory reserve and complete dependence on aerobic metabolism make brain tissue particularly vulnerable to effects of ischemia. A spectrum of severity is generally observed in the affected region of the brain, owing to the presence of collateral circulation. Thus, part of the brain parenchyma (core) undergoes immediate death, while others may only be partially injured with potential to recover (penumbra).

The survival, recovery and ultimate outcome of an individual who has sustained in acute stroke may be influenced by many variables [10].

Demographic Variables

Includes age, gender and race. Survival is found to be significantly better in men than women, young than in old, married than in the single, rural areas than urban areas and in those discharged home than in those transferred to long term care hospitals.

General Medical Characteristics

Hypertension, diabetes mellitus, heart disease, atrial fibrillation, hyperlipidemia, obesity, past history of stroke, physical inactivity, estrogen therapy, high alcohol consumption and smoking are associated with increased likelihood of recurrent stroke and thereby would influence long term survival. Comorbidities like heart disease, COPD, Peripheral vascular disease, Parkinson's disease, Polyneuropathy, Osteoarthritis etc. have a direct effect on functional recovery and compound the patient's disabilities.

Lesion related variables

Survival is better in infarction than in hemorrhage and in subarachnoid hemorrhage than in intracerebral hemorrhage. Anterior circulation infarcts have higher risk of death and so also intracerebral or subarachnoid hemorrhage. Occurrence of coma at stroke onset reflects severity and is an important predictor of 30-day survival. Bilateral pyramidal signs, generalized seizures, abnormal respiratory pattern etc. reflect

brain stem dysfunction and in combination are related to a very high risk of early death. Severity of paralysis, urinary and bowel incontinence also adversely influence the outcome.

Specific Therapy Intervention

Better management of respiratory and cardiac problems in acute phase may result in decreased mortality.

Biochemical Variables

Hyperglycemia at stroke onset even in non-diabetic patients is an adverse prognostic factor. Protein C and S have been found to be decreased in some patients with ischemic stroke and predict adverse outcome. Lipoprotein (a) is found to be an independent risk factor for arteriovascular disease. Recent studies have suggested that presence of microalbuminuria is associated with poor stroke outcome.

Conclusion

- Hypertension constitutes the major risk factor in this stroke population as 79% of population is hypertensive with 73% males and 89.2% females being hypertensive in their respective population
- About 94 % in our study had documented hypercholesterolemia, whereas in 67% of patients' triglycerides were high.
- Other risk factors like Diabetes Mellitus, Dyslipidemia were present in 32 % and 18 % of study population respectively.

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