



Neurological manifestation in patients with hemorrhagic and ischemic stroke: a study in Indian population

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Abstract

Background: *The two types of brain stroke are hemorrhagic and ischemic. The symptoms that follow a stroke aren't significant and depend on the brain area affected and damaged. Parameters for predicting long-term outcome in such patients have not been clearly defined. This study was undertaken to predict the neurological manifestations and outcomes of stroke patients.*

Methods: *A descriptive hospital-based study of the neurological symptoms and signs of 60 patients with stroke, including headache, seizure, eye movement disorder, pupil size, Glasgow Coma Scale (GCS), nerve palsy, aphasia, hemiplegia, monoplegia, ataxia, vertigo, were analyzed.*

Results: *In the present study, dilated pupils, agitation, severe headache, lower GCS score, seizure, and eye gaze impairment had significantly higher prevalence in hemorrhagic stroke patients ($P < 0.001$) as compared to ischemic stroke patients.*

Conclusion: *Although this result provides different parameters for the stroke types, imaging studies are still the gold standard modality for diagnosis.*

Keywords: *Stroke, ischemic, hemorrhagic, clinical presentation, seizure.*

Introduction

Stroke is a medical condition in which poor blood flow to the brain results in cell death. It is the third leading cause of death and is the most common cause of morbidity and prominent disability in survivors. It is a condition in which there is an acute neurologic insult that occurs as a result of ischemic cerebral infarction (87% of strokes) or

brain hemorrhage (13% of stroke)¹⁻³. The two categories of stroke are ischemic stroke and hemorrhagic stroke. Both result in parts of the brain not functioning properly. Ischemic stroke pertains to having very little blood supply to provide parts of the brain with enough oxygen and nutrients, while hemorrhagic stroke pertains to too much bleeding within the enclosed cranial

cavity.¹ These two broad categories can be further subdivided based on different etiologies, clinical courses, and treatment strategies. There are three subtypes of brain ischemia,² thrombosis, embolism and systemic hypoperfusion. In brain hemorrhage, there can be bleeding directly into the brain parenchyma, which is called intracerebral hemorrhage. If bleeding occurs in the cerebrospinal fluid within the subarachnoid space, this is known as subarachnoid hemorrhage³⁻⁵.

Early diagnosis is the key in stroke patients to prevent further complications. Non-contrast computed tomography (CT) scan is most commonly used to differentiate the two types of stroke. CT scan is not available at many places so the neurological signs and symptoms are very important to distinguish stroke type. The most common signs and symptom include an inability to move or feel on one side of the body, problems understanding or speaking, dizziness, or loss of vision to one side⁶⁻⁷. A hemorrhagic stroke may also be associated with a severe headache. The symptoms of a stroke can be permanent. The main characteristics are focal or non-focal symptoms, negative or positive symptoms and sudden or gradual onset. Many studies show that, neurological signs such as eye gaze and pupil size changes can be reliable facts to distinguish stroke types⁸⁻¹⁰. In the present study, we had tried to evaluate the neurological findings and Glasgow Coma Scale (GCS) changes and identify their prevalence in each type of stroke. Early diagnosis of stroke can help in early patient referral to higher centers and decrease in stroke complications and injuries.

Methods

Participants of adult age-sex group diagnosed with stroke as defined by the World Health Organization (WHO)¹¹ were studied in this study. Data were collected from April 2017 to March 2018. The study was approved by hospital's Ethics Committee. Written informed consent was obtained from consecutive two hundred adult

patients with stroke admitted < 2 weeks, in whom brain imaging (computed tomography/magnetic resonance imaging) confirmed data. We collected data on demographics, risk factors, diagnosis modalities, imaging findings and stroke characteristics were collected at the time of admission. For data collection, WHO STEPS stroke approach was followed. Patients were contacted telephonically and by face-to-face interview 90 days after discharge to assess their outcome.

Statistical analysis

The statistical measures calculated were descriptive statistics, Chi-square test and independent t-test. For the comparison of categorical variables, Chi-square test was used. Frequency of the various symptoms with respect to number of participants was calculated. Cross tabulation of toxicity symptoms with the other variables were also calculated by using Chi-square (χ^2) test with descriptive statistics and represented. $P < 0.05$ was considered as statistical significant. Statistical analysis was performed with SPSS software (IBM SPSS Statistics, NY, USA).

Results

Out of 200 patients with stroke diagnosis admitted to emergency department in our center, age range was from 21 to 92 years. About 46% of patients were female, and 54% were male. The diagnosis was hemorrhagic stroke in 16% patients and ischemic stroke in 84% patients.

Severe headache and irritability were the most prevalent manifestations that were present in 68.8% and 34.6% hemorrhagic patients. Eye gaze impairment, seizure and vertigo were present in 40.7%, 9% and 16% hemorrhagic patients respectively. During pupil examination, midriatic pupil was observed in 25.3% patients, and 15% patients had miosis. Mean age of patients, each sex proportion and patients manifestations were separated by their diagnosis.

In order to distinguish stroke type regarding to neurological manifestations, the following

variables were studied and analyzed: GCS, acute onset headache, progressive headache, agitation, pupil size, vertigo, hypertension, coronary heart disease, drug abuse and seizure. According to GCS records, mean GCS (SD) score in ischemic stroke patients was 10.67 (0.71), however, the minimum score was 5 and the maximum was 13. Though, in hemorrhagic stroke patients, mean (SD) GCS score was 7.07 (0.162), with minimum of 4 and maximum of 14 (independent sample test $P<0.001$). During examination, eye gaze impairment was present in 22.7% ischemic stroke patients and 41.1% hemorrhagic stroke patients (chi-square test $P<0.001$). Out of 200 patients, only 7% had seizure manifestation, and all of them belonged to the hemorrhagic stroke group.

Agitation prevalence was 12% among ischemic stroke patients and 38% among hemorrhagic patients $P<0.001$. 18% patients with acute onset headache were in the ischemic stroke group, and 68% patients with acute onset headache in the hemorrhagic stroke group.

Table 1 shows male and female patient enrolled for the study and the two types of stroke See example as below, please insert value by reading result section.

Variable	Number	Percentage
Sex		
Male	108	54%
Female	92	46%
Lesion		
Ischemic	168	84%
hemorrhagic	32	16%

Table no. 2 Clinical parameter of Ischemic and Hemorrhagic stroke patients

Variable		Number of patients	
		Ischemic (n=168)	Hemorrhagic (n=32)
Severe Headache		30(17.9%)	22(68.8%)
Mild headache		40(23.8%)	08(25%)
Irritability		20(12%)	12(37%)
Pupil size	Small	22(13.0%)	08(25%)
	Dilated	16(9.5%)	05(15.6%)
	Normal	130(77.38%)	19(59.5%)
Systolic Blood pressure (≥ 200) (on admission)		82(48.8%)	28(87.5%)
Low GCS (≤ 7)		15(8.9%)	06(18.8%)
Vomiting		17(10.1%)	12(37.5%)
Seizure		04(2.3%)	03(9.4%)
Vertigo		10(6%)	05(15.6%)
Diabetes		72(42.8%)	06(18.7%)
Previous HTN		42(25%)	15(46.9%)
Coronary artery disease		62(37%)	05(15.6%)
Congenital/ Rheumatic heart disease		06(3.5%)	01(3.1%)
On Antiplatelet/anticoagulant		44(26.1%)	05(15.6%)
Smoking		20(12%)	7(22%)
Alcohol/Drug abuse		42(25%)	06(18.7%)
Obstructive sleep disorder		30(17.8%)	04(12.5%)

Discussion

The World Health Organization defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours". In 2015, stroke was the second most frequent cause of death after coronary artery disease, accounting for 6.3 million deaths (11% of the total). About 3.0 million deaths resulted from ischemic stroke while

3.3 million deaths resulted from hemorrhagic stroke¹²⁻¹⁴.

Hypertension (HTN), myocardial infarction (MI), thrombolytic consumption, tobacco smoking, obesity, high blood cholesterol, diabetes mellitus, and atrial fibrillation are the most common risk factors for stroke onset.¹⁴⁻¹⁵ Stroke symptoms typically start suddenly, over seconds to minutes. The more extensive the area of the brain affected,

the more functions that are likely to be lost. Different findings are able to predict the presence or absence of stroke to different degrees. Sudden-onset face weakness, arm drift and abnormal speech are the findings most likely to lead to the correct identification of a case of stroke. A mnemonic to remember the warning signs of stroke is FAST (facial droop, arm weakness, speech difficulty, and time to call emergency services)

We provide data for the comprehensive information on demographics, risk factors, symptomatological, mechanisms, imaging characteristics, and outcomes of inpatient ischemic and hemorrhagic stroke in India. Our results emphasize an urgent need to address modifiable and vascular risk factors in India and other developing countries. The below-60-year age groups, predominantly men, are the key income generators suggesting a heavier financial burden of stroke in India.

Our study provides good insights about ischemic and hemorrhagic risk factors in India. We observed a higher rate of diabetes mellitus, hypertension and dyslipidemia as compared with western populations. A high rate of smoking in the form of cigarettes, bidis, and hookah, confer a higher risk of stroke particularly in men.¹³⁻¹⁴

Results of our study group patients are typical representatives of stroke victims, and this fact indicates that the current study results are applicable to all stroke patients. In our study, ischemic stroke diagnosis was the most prevalent stroke type. Mean age of patients with ischemic stroke was higher than hemorrhagic stroke patients. In the current study, statistical analysis claimed that lower GCS scale, agitated mood, acute onset headache, seizure, and midriatic pupil had a higher prevalence in hemorrhagic strokes, which was similar to the previous studies¹⁶⁻¹⁸.

Comparing the prevalence in the two group of stroke patients showed a significant relation between hemorrhagic stroke onset and the clinical manifestations in patients ($P<0.001$). This fact suggests that the presence of these signs and

symptoms can strongly suggest the type of stroke¹⁷⁻¹⁸ and help medical care professionals in primary diagnosis making. Clinical manifestations are helpful in distinguishing stroke types during primary visit but imaging is still the gold standard diagnostic method for stroke patients. These results can be applicable for patient management, treatment and timely referral to higher center. Our data is important in advancing stroke care and designing stroke guidelines in developing countries.

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