

A Hospital-Based Study of Stroke in Young from North East India

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Abstract

Introduction: A study of stroke among young adults and children has recently become a subject of interest. This is because it has a major impact on the individual and society. Studies of stroke in young can lead to therapeutical results affecting both short- and long-term outcomes. **Methods:** This paper is based on a hospital-based retrospective study, of stroke in young, for a duration of 1 year. **Results:** The study revealed stroke in young in 31.38% of all strokes, with cerebral infarction in 50.66%, followed by intracerebral hemorrhage in 41.33%, subarachnoid hemorrhage in 4.66%, and cerebral venous thrombosis in 3.33%. The most common presenting symptom was hemiparesis. The most prevalent risk factor for stroke in young was alcohol consumption, followed by traditional risk factors such as hypertension and smoking. Diabetes was detected less in our study. **Conclusion:** Although traditional risk factors are associated with stroke in young, unfavorable behavioral pattern such as alcohol abuse may cause and promote development stroke in young.

Keywords: cerebral infarction, cerebral venous thrombosis, intracerebral hemorrhage, risk factors, Stroke in young

INTRODUCTION

Stroke in young and children has recently attracted a large share of attention. Data on stroke in young are not uniform as the age group included in the studies varies widely in the published reports. Majority of the published reports keep the age of stroke in young between 15 and 45 years. A hospital-based study from India showed the proportion of stroke in young ranging between 15% and 30%.^[1] In population-based study, 8.8% of stroke participants were young.^[2] In the United States, 532,000–852,000 persons aged 18–44 years have had a stroke. Of them, among 15–44 years, approximately 50% are ischemic stroke, 20% are intracerebral hemorrhage (ICH), and 30% are subarachnoid hemorrhage (SAH).^[3]

Aims and objectives

The study of stroke in young is important for various reasons. The etiology and risk factors are more diverse and different as compared to the elderly. Therefore, these may indicate separate therapeutic approaches. Studies on stroke in young are lacking from the northeastern part of India, which comprise a unique ethnic entity (the tribes of Meghalaya are believed to be the descendants of Tibeto-Burman race and Proto-Australoid-mon-

khmer race). The aim is to study the profile of stroke cases among the young.

METHODS

This is a retrospective hospital-based study of stroke in young, conducted in the Department of Neurology of North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, which is a tertiary care center in the region. The study was conducted for a period of 1 year, between January 2016 and January 2017. The patients were identified from medical records, and after appropriate consent for accessing, medical records were obtained. The study protocol was approved by the institutional review board.

Inclusion criteria

Patients in the age group of 15–45 years admitted in the hospital, who fulfilled the WHO definition of stroke.

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Exclusion criteria

Patients in the age group of 15–45 years with previous history of stroke and patients with a history of head trauma preceding admission and secondary cause of intracerebral bleed like bleed in a tumor were excluded from the study.

Data were collected according to a predefined protocol. The data were registered as demographic characteristics, family history, risk factors, neurological examination, and diagnostic data.

The patients underwent neuroimaging initially with computed tomography (CT) scan and later with magnetic resonance imaging (MRI), magnetic resonance venography (MRV), CT angiography, and digital subtraction angiography (DSA) if necessary. The following tests were also done: blood coagulation profile, routine hemogram, blood glucose test, serum lipid profile, viral markers, blood venereal disease research laboratory (VDRL), electrocardiogram (ECG), echocardiography, carotid Doppler, and chest X-ray. Detailed coagulation profile and vasculitis profile were done in appropriate situations. Cerebrospinal fluid (CSF) analysis for CSF VDRL was done in two patients.

Stroke was classified as cerebral infarction, ICH, or SAH. Cerebral infarction was classified as atherosclerotic, cardioembolic stroke, other determined cause, and undetermined cause (cryptogenic stroke). Hemorrhagic stroke was categorized as basal ganglionic, lobar, thalamic, pontine, cerebellar, and intraventricular (primary, or secondary). Cerebral venous thrombosis (CVT) was kept as a separate category.

RESULTS

A total number of patients included in the study were 150. The total number of all stroke patients in this duration was 478. Stroke in young represented 31.38% of all strokes. The mean age of onset was 34 years. The ratio of male to female was 1.34:1, showing male preponderance.

All patients underwent CT brain on admission. MRI brain was done in 107 patients. Ten patients underwent DSA. ECG and echocardiography were done in all the patients. Carotid Doppler was done in patients of cerebral infarction. MRV was done in patients suspected of CVT.

Overall, the most common presenting symptom was hemiparesis in 124 (83%). Headache was more common in hemorrhagic stroke. The presence of seizure was found in 23 (37.09%) hemorrhagic and 5 (6.57) of ischemic stroke. Seizure was found in 2 (40%) of patients with CVT. Headache was presenting symptom of all the patients with SAH. Neck rigidity was detected in all the patients with SAH, 17 (27.41%) patients of ICH with intraventricular extension, and 2 (3.22%) patients of intraventricular hemorrhage.

A total number of patients with cerebral infarction were 76 (50.66%). The most common category was atherosclerotic

39 (51.31%), followed by cardioembolic 12 (15.78%), other determined cause 9 (11.84%), and undetermined cause 16 (21.05%). Cerebral infarction was more common in males, with a male-to-female ratio of 1.23:1. The most common risk factor in cerebral infarction was alcohol abuse 52 (68.42%). History of smoking was present in 34 (44.73%). Hypertension which is a common risk factor of stroke was detected in 11 (14.47%) patients. Similarly, diabetes mellitus was detected in 2 (2.63%). Lipid profile was deranged in 4 (5.26%) patients, showing most commonly elevated cholesterol level. The ratio of alcohol abuse in male to female was 1.11:1. In cardioembolic stroke, the most common cardiac lesion was rheumatic heart disease 4 (33.33%), followed by dilated cardiomyopathy 2 (16.66%) and patent foramen ovale 2 (16.66%). Takayasu's arteritis was detected in two patients, all of which were female. Vasculitis was detected in two patients, which was due to systemic lupus erythematosus. Evidence of neurosyphilis in the form of blood and CSF VDRL positive and blood treponema pallidum hemagglutination test (TPHA) positive was detected in one male and one female patient. One male patient of cerebral infarction was detected as positive for human immunodeficiency virus. Two patients of tuberculous meningitis had evidence of cerebral infarction. Two patients of moyamoya disease presented with cerebral infarction. Cause of infarction could not be ascertained in 16 (21.05%) patients.

The total number of patients with ICH was 62 (41.33%). The ratio of male to female was 1.81:1. The most common site was basal ganglia 44 (70.96%), followed by lobar 16 (25.8%). Seventeen (27.41%) of ICH had intraventricular extension. Primary intraventricular hemorrhage was detected 2 (0.32%). The most common risk factor was alcohol abuse 41 (66.12%). Common risk factor hypertension was detected in 11 (17.74%). Intracranial arteriovenous malformation was detected in 5 (0.80%). Coagulation abnormality was detected in 16 (25.80%), in the form of elevated prothrombin time. SAH was detected in 7 (4.66%) patients. Ratio of male to female patients was 1.5:1. DSA revealed aneurysm in 3 (42.85%) patients. Two patients were DSA negative. DSA could not be done in 1 patient.

CVT was detected in 5 (3.33%) patients. All were female. Three of them were in puerperal period. All the patients had aseptic CVT. Most common site was superior sagittal sinus. Risk factor of CVT were as follows: Anti-phospholipid antibody syndrome was detected in one patient, Protein S deficiency in two patients, and coagulation profile could not be done in two patients.

DISCUSSION

Data from a systematic review of population-based stroke incidence studies revealed the rate of total stroke for those aged <45 years ranged from 0.1 to 0.3/1000 person-years.^[4] Hospital-based studies from India revealed a high proportion of stroke in young ranging between 15% and 30%.^[1] However, in population-based studies, stroke in young was found to be

8.8%,^[2] which is similar to data from the western countries. The present study detected stroke in young in 31.3%. The high proportion may be due to the inclusion of patients with CVT and SAH.

An overall male preponderance was seen. This is similar to data from Indian^[5,6] and western studies.^[7,8] The male preponderance was seen in both ischemic and hemorrhagic stroke. However, some population-based studies reveal an increased incidence among women under 30 years old, as do some case series,^[9] while studies also show risk of hemorrhagic stroke more in men, with no significant sex difference in risk of infarct or SAH.^[10]

However, all patients with CVT were female.

Cerebral infarction is the most common type of stroke in young [Figure 1]. The stroke in young in the northern Manhattan stroke study^[10] detected 45% infarcts, with intracranial atherosclerosis in 9%, cardioembolic 6%, cryptogenic 55%, and other causes 6% [Figure 2]. Data from several studies reveal that 21%–48% of strokes in young are caused by atherosclerotic large artery disease, cardioembolism 13%–35%, and cryptogenic 7%–40%.^[11] Data from our study are similar to the other studies. The classification of ischemic stroke depends on the investigation intensity.

Traditional risk factors such as hypertension, diabetes mellitus, and deranged lipid profile were detected in our study, of which only hypertension was significantly associated with ischemic stroke. Hypertension was reported as a risk factor in most studies. Diabetes mellitus has been reported as a risk factor for ischemic stroke from India^[6] and Switzerland,^[12] but this was not found in our study. However, diabetes was not reported as a risk factor for ischemic stroke in Sweden^[13] and Taiwan.^[14] Increased level of total cholesterol has been reported in ischemic stroke in young from most population,^[11] but it was not a significant risk factor in our study.

Important modifiable risk factors such as smoking and alcohol consumption were found to be significantly associated with ischemic stroke in our study. Interestingly, alcohol consumption was high even among female patients. High alcohol consumption is associated with ischemic stroke,

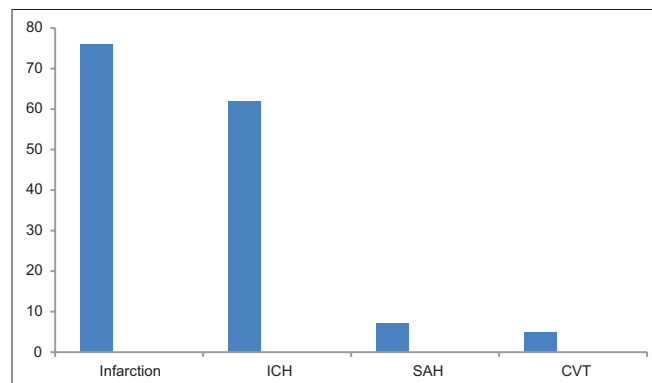


Figure 1: Distribution of Stroke in Young

due to the reversal of beneficial effect of light consumption on lipid metabolism, and increases the risk of acute ventricular and supraventricular cardiac arrhythmias, marked blood pressure elevation, platelet activation, and humoral hypercoagulability.^[15] The association of alcohol consumption with stroke was higher in our study, then reported by other studies.

Moyamoya disease and Takayasu's arteritis were detected in two each, patients of ischemic stroke. This was higher than reported in a study from India.^[6] Moyamoya disease in Asian population occurs in 6%–15% of cases of nonatherosclerotic vasculopathy.^[9] Takayasu's arteritis is also reported among Indians and causes stroke in 40% of children and adolescents.^[2]

Tuberculosis as a cause of stroke was found in two patients, which is lower than reported in other studies.^[2] Meningovascular syphilis was an important risk factor for stroke in young, which has not been reported in recent studies. However, it may still be relevant, as shown in our study.

Rheumatic heart disease is the most common cause of cardioembolic stroke in young, as shown by our study and other studies.^[11] However, our patients had no infective endocarditis, which is usually common association of rheumatic heart disease. Atrial fibrillation was not common in our study.

The proportion of hemorrhagic stroke and SAH is higher in the young (40%–55%), as compared to the older subgroups (15%–20%). The present study also shows similar results. The ratio of hemorrhage to ischemia varies considerably with the race/ethnicity, sex, and location of the stroke patient. In Osaka, Japan, among 252 stroke patients of 16–40 years, 175 had hemorrhagic stroke (70%),^[16] whereas in a British series, of similar age group, only 20% had hemorrhages.^[17] In the present study, hemorrhage occurred in 41.33%. The high percentage may be due to referral bias as hemorrhage patients are more likely to be admitted as inpatients, due to their serious nature. The male preponderance seen in the present study is similar to other studies; however, studies also show nonsignificant sex differences in hemorrhagic stroke.^[10] Hypertension

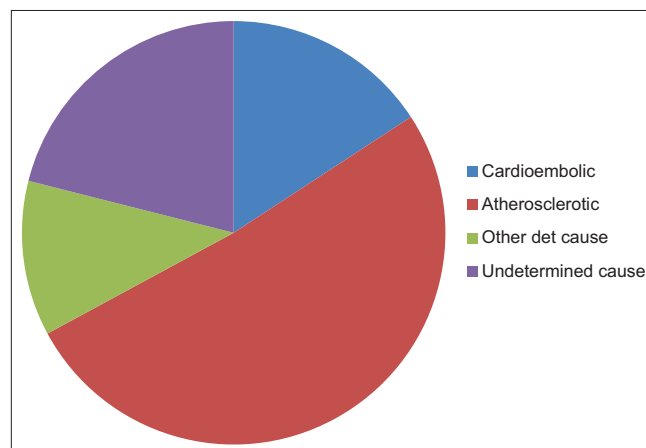


Figure 2: Types of Ischemic stroke

was a significant risk factor for hemorrhagic stroke in the study so was alcohol abuse. A synergistic effect of alcohol and hypertension can increase the risk of hemorrhage.^[18] Hemorrhage may be also caused by alcohol-related cirrhosis of the liver, with hypoprothrombinemia.

CVT was found to be 12 times more common in India than in the western countries.^[2] Studies have reported stroke in young due to CVT from 2%^[2] to as high as 16.3%.^[19] Although infection is a major cause of CVT in young, none of the patients in the present study had infection as a cause of CVT.

CVT is reported in 16.3% of total stroke in young in a hospital-based study,^[19] which is higher than reported in our study. Most of the patients were postpartum, as is also reported by other studies.

There are several limitations to our study. Various causes of stroke in young, such as migraine, homocysteine level, nonatherosclerotic large artery occlusive disease (arterial dissection), and mitochondrial disorders, could not be investigated. Family history of stroke could not be documented in all cases. Being a hospital-based study, a referral bias may also be present in the study.

CONCLUSION

Stroke in young requires a different approach to investigate and treat. This is due to the different underlying etiology as compared to elders. Although traditional risk factors, such as hypertension, diabetes, and smoking, are associated with stroke in both elderly and young, our study shows that other modifiable risk factors such as alcohol consumption were also prevalent. Unfavorable behavioral patterns may cause and promote the development of well-documented risk factors. There is a need for population-based studies of stroke in young, which will provide information on underlying etiology and incidence rates, in different populations.

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Conflicts of interest

There are no conflicts of interest.

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