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Original Research Article

Etiology and risk factors among young patients presenting with stroke in a tertiary care hospital in South India

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ABSTRACT

Background: Stroke is one of the leading causes of disease and death throughout the world with the incidence rising steeply with age. The occurrence of stroke in young is rare but once it occurs the outcome is severe. Limited studies have been performed in the Indian population to describe the clinical presentation and etiology of young adults with stroke. The objective of present study is to assess the etiology, risk factors and clinical presentation among patients who visit a tertiary care centre with a clinical diagnosis of stroke in individuals less than 45 years of age.
Methods: Consecutive patients visiting the Dept of General Medicine & Neurology, SRM Hospital aged between 15-45 years with abrupt onset of focal or global neurological deficit attributable to vascular cause and persisting for more than 24 hours were included into the study. Patients with traumatic injury and transient ischemic attack were excluded. The clinical features, laboratory and radiological investigations were obtained from the patient's records.
Results: The mean age of the study group was 36.42±6.92 years. The most common risk factor amongst study subjects was smoking (36%). Hemiplegia was more commonly seen in males (38 vs. 14 %, p= 0.26) than in females. Seizures were more commonly seen among subjects with hemorrhagic stroke and cortical venous thrombosis (p= 0.001). Among subjects with ischemic stroke, the most common etiology was hypercoagulation. The most common arterial territory involved was Middle cerebral artery territory 84.84% with the Left MCA (53.5%) being more common than right MCA (46.4%).
Conclusions: The clinical presentation and etiology among young patients with stroke appear to remain consistent with that reported earlier in the literature. The paucity of rare presentations of stroke in our study could be attributable to the limited sample size of our study.

Keywords: Cortical venous thrombosis, Hemorrhagic stroke, Hemiplegia, Ischemic stroke, Middle cerebral artery, Stroke

INTRODUCTION

Stroke is one of the leading causes of disease and death throughout the world with the incidence rising steeply with age. In comparison, stroke in young individuals is less common; however stroke in a young person may be devastating in terms of productive years lost and impact on a young person's life. Stroke was defined by World Health Organization criteria as rapidly developing clinical signs of focal, at times, global disturbance of cerebral function lasting for more than 24 hours or leading to death with no apparent cause other than vascular origin.[1-2] Some causes of stroke in young are more frequent in adults under 45 years of age compared to older individuals and some are treatable causes to prevent in young .While a specific definition of " Stroke in Young" is lacking , many studies consider young stroke to pertain to individuals under 45 years of age.[3]

Ischemic stroke in young adults (15-45 years) is relatively frequent, accounting for more than 10-15% of all first ischemic strokes. Its causes are heterogeneous and while it generally has a good prognosis, it has a significant socioeconomic impact, including functional deficits and financial costs.[4-10] An accurate etiological diagnosis is crucial for preventing new episodes and additional functional deficits.

Currently, the most frequent causes of ischemic stroke in young adults are cardioembolism, premature atherosclerosis, and dissection of extracranial arteries, migraine, drugs and hypercoagulable states.[11-14] However, it has not always been like this, as previously undetermined etiology was by far the most prevalent. Although still common, undetermined etiology is now less frequent as a result of diagnostic advances.[12-13] The aim of the study was to assess the etiology, risk factors and clinical presentation among patients who visit a tertiary care centre with a clinical diagnosis of stroke in individuals less than 45 years of age.

METHODS

This study was a cross sectional study that was conducted in the Dept of General Medicine and Department of Neurology at SRM Medical College Hospital and Research Centre, Chennai, Tamil Nadu, from October 2012 to July 2014. Data was collected from patients admitted in SRM Medical College Hospital & Research Centre, Kattankulathur in the Department of Medicine.

Inclusion criteria

Patients aged between 15 - 45 years with abrupt onset of focal or global neurological deficit attributable to vascular cause and persisting for more than 24 hours were included in the study. Patients with head injury, transient ischemic attack were excluded from the study. Detailed history, clinical examination and investigations performed among the study subjects were recorded. History included all the symptoms pertaining to stroke in detail with emphasis on all the risk factors attributable to the stroke at young age.

A detailed clinical examination was done and neurological deficits were identified. Relevant investigations like hemoglobin, total white cell count, erythrocyte sedimentation rate, routine urine analysis, blood glucose, blood urea, serum creatinine, blood VDRL, serum lipid profile, chest X-ray, CT scan brain, lumbar puncture for CSF analysis and electrocardiography were done for all patients. Bleeding time, clotting time, echocardiograms were done for certain patients who required these investigations. In ischemic stroke, CVT, protein C, protein S, homocysteine, antithrombin III, and antiphospholipid antibody were measured. The results were analyzed to assess the aetiology, risk factors, and the pattern of clinical and radiological profile. Consent was taken from the patients or patient's legally accepted representative for recording data from patient's records.

Statistical analysis

Data were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR). Statistical analysis was performed using computer software programs such as Statistical Package for Social Scientists, SPSS 16.0.

RESULTS

A total of fifty patients, 36 (72%) males and 14(28%) females diagnosed to have stroke were included in the study. The mean age of the study group was 36.42±6.92 years (Table 1).The most common risk factor amongst study subjects was smoking (36%). The other clinical features and risk factors among study subjects are also shown. (Table 1, Figure 1 and Figure 2).

Table 1: Characteristics of study patients.

Characteristics	Value
Age (years)	36.42±6.92
Male (%)	36 (72)
Seizures(%)	16 (32)
Consciousness(%)	17 (34)
Dysphasia(%)	11 (22)
Hemi-sensory loss(%)	8 (16)
Cerebellar deficit(%)	4 (8)
Smoking (%)	18 (36.0)
Alcohol (%)	15(30.0)
Overweight (%)	6 (12)
Diabetes Mellitus (%)	12 (24.0)
Hypertension (%)	16 (32.0)
CAD (%)	9 (18.0)
TIA (%)	1 (2.0)
Family History of stroke (%)	1 (2.0)
OCP usage among females (%)	2 (14.0)

CAD- Coronary artery disease, DM – Diabetes mellitus, HTN-Hypertension , TIA- Transient ischemic attack, OCP- Oral contraceptive pill.

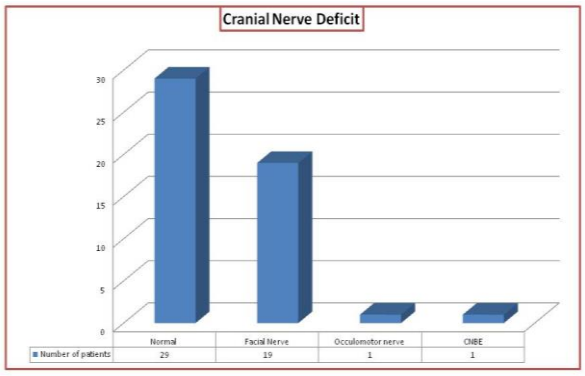


Figure 1: Cranial Nerve Deficit

38 % of study subjects presented with facial nerve palsy. (Figure 1) Hemiplegia was more commonly seen in males (38 vs. 14 %, p= 0.26) than in females, though not statistically significant (Figure 2).

Seizures were more commonly seen among subjects with hemorrhagic stroke and cortical venous thrombosis (p= 0.001). Among diabetic subjects CVT was more common than the other stroke types (p=0.03). Among hypertensive subjects, hemorrhagic stroke was more common the other stroke types (p=0.03).

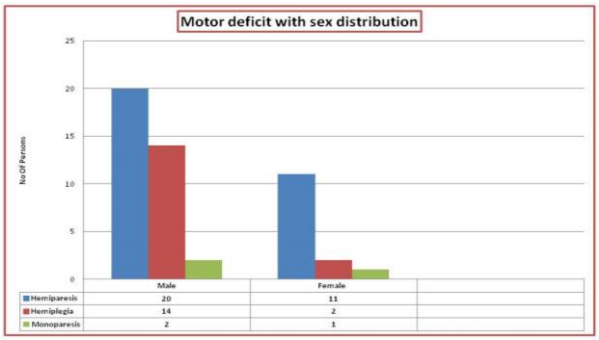


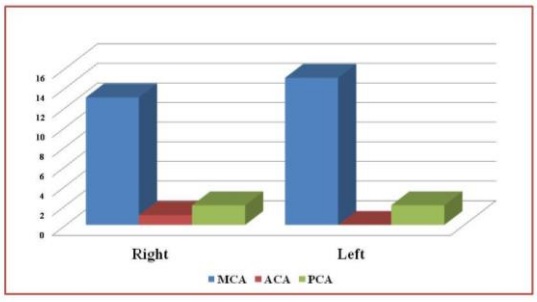
Figure 2: Motor deficit with sex distribution.

Table 2: Risk factors and clinical presentation among the different stroke subsets.

Clinical Parameter	Ischemic stroke	Cerebral venous thrombosis (CVT)	Hemorrhage	Multiple stroke	P value
Age	36.6±7.96	36.3±6.37	37.7±4.15	35.0±9.84	0.92
Male Gender (%)	18 (78.3)	4 (66.7)	4 (57.1)	4 (57.1)	0.59
Clinical presentation (%)					
Seizure (%)	3 (13.0)	5 (83.3)	0	5 (71.4)	0.001
Consciousness (%)	7 (30.4)	2 (33.3)	2 (28.6)	5 (71.4)	0.23
Speech					
Present (%)	7 (30.4)	0	2 (28.6)	0	0.33
Absent (%)	13 (56.5)	4 (66.7)	4 (57.1)	4 (57.1)	0
CNBE*(%)	3 (13.0)	2 (33.3)	1 (14.3)	3 (42.9)	0
Sensory deficit (%)	3 (13.0)	0	2 (28.6)	1 (14.3)	0.52
Cerebellar deficit (%)	2 (8.7)	0	0	1 (14.3)	0.64
Risk factors					
Smoking (%)	11 (47.8)	4 (66.7)	3 (42.9)	1 (14.3)	0.27
Alcohol (%)	8 (34.8)	3 (50.0)	2 (28.6)	3 (42.9)	0.85
DM (%)	5 (21.7)	4 (66.7)	0	1 (14.3)	0.03
HTN (%)	6 (21.6)	0	5 (71.4)	2 (28.6)	0.03
Dyslipidemia (%)	15 (65.2)	4 (66.7)	4 (57.1)	3 (42.9)	0.74
BMI	21.8±2.56	20.9±2.32	23.3±3.04	21.0±3.61	0.36
IHD (%)	0	1(16.7)	0	1 (14.3)	0.29
Previous TIA (%)	1 (4.3)	0	1 (14.3)	1 (14.3)	0.60
Family History of stroke (%)	1(4.3)	0	0	0	0.82

*CNBE – cannot be examined , DM – Diabetes mellitus, HTN- Hypertension , IHD- Ischemic heart disease, TIA- Transient ischemic attack

There was no difference with respect to other characteristics among the stroke subtypes. Among subjects with ischemic stroke, the most common etiology was hypercoagulation (55%) (Table 3). The most common arterial territory involved was Middle cerebral artery territory 84.84% in which Left (53.5%) more common than right MCA (46.4%). One patient had anterior cerebral artery involvement. Among venous thrombosis, the most common site was superior sagittal sinus thrombosis (70%), while transverse sinus accounted for the remaining 30% of the lesions (Figure 3a and 3b).



MCA-middle cerebral artery, ACA- anterior cerebral artery ,PCA- posterior cerebral artery

Figure 3a: Artificial territory involved in stroke.

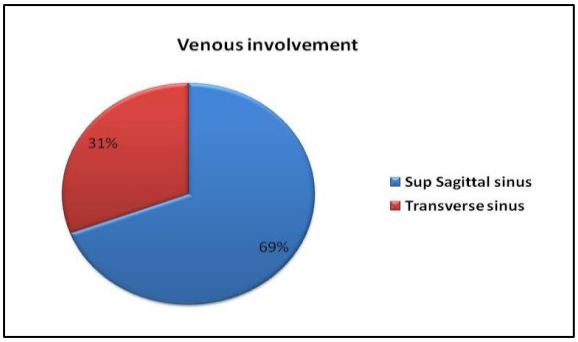


Figure 3b: Venous involvement in stroke.

Table 3: Etiology of stroke among study patients.

Ischemic Causes of stroke in young	
Cause	**No of young patients**
Atherosclerosis (%)	8 (19.51)
Hypercoagulable causes (%)	22 (53.65)
Polycythemia (%)	5 (12.19)
CVD (%)	4 (9.75)
TM (%)	1 (2.43)
Undetermined (%)	1 (2.43)
Hemorrhagic causes of stroke in young	
Hypertension (%)	7 (77.78)
AVM (%)	1 (11.11)
Undetermined (%)	1 (11.11)

AVM-Arteriovenous malformation, CVD-cardiovascular disease, TM - Tuberculosis meningitis

DISCUSSION

Our study showed that seizures were the common mode of presentation among patients with CVT. A multicenter, prospective, observational study done in CVT by Ferro et al showed that during the time of presentation 40% of the patients had seizures and 7% of the patients developed seizures within 2 weeks of diagnosis.[15] A study done by Mahale r et al on 46 patients with acute seizures showed that on univariate analysis, altered mental status, paresis , GCS score, hemorrhagic infarct on imaging, involvement of frontal lobe , superior sagittal sinus (p = 0.008), and high D-dimer levels were significantly associated with acute seizure. It was also observed that the hemorrhagic infarct on MRI and high D-dimer was independently predictive for early seizure on multivariate analysis Mahale r et al.[16] In contrast to our study Bladin et al conducted one international, prospective, multicentric analytical inception cohort study for 34 months. A total of 2021 patients presented with acute stroke were admitted, out of which 124 patients with previous epilepsy or without computerized tomographic diagnosis were excluded from the study. The mean follow up was for nine months. The results showed that out of 1897 patients 168 (8.9%) patients with stroke (25 out of 265 hemorrhagic stroke patients and 140 out of 1632 ischemic stroke patients) experienced seizures. Seizures were commoner in hemorrhagic stroke patients than ischemic stroke patients bladin et al.[17] The most common risk factor seen among our study subjects was smoking (36%). Sandoval et al in his study included 200 patients for final analysis from National Institute of Neurology and Neurosurgery, Mexico with mean age, 27±6.7 year it showed that use of tobacco was the most common risk factor (20%) for inducing stroke followed by hypertension (13%).[18] In meta-analysis of 32 separate studies of relation between smoking and stroke analysed by Roger Shunton and Beevers there was a strong association between smoking and incidence of stroke.[19] In contrast, a retrospective review of case records from patients presented with ischemic stroke within the age of 18-45 years was conducted from 2005 to 2010 by Dash et al. Data of patients like clinical profiles, medical histories, diagnostic test results, and modified Rankin Scale scores were examined from hospital discharge summary. The result showed that hypertension (34.4%) was the most common risk factor among the study patients.[20] A retrospective, record-based study was done by Harsha Kumar HN et al in Kasturba Medical College, Mangalore on patient aged from 15-45 years. Hypertension 79 (72.5%) was observed to be the most common risk factors among the study patients.[21]

Our study showed that hypertension was more common in hemorrhagic stroke where as diabetes and alcohol was most frequent risk factor in cerebral venous thrombosis and ischemic stroke. In a study it was seen that hypertension was more significantly associated with intracerebral haemorrhage than with ischemic stroke however smoking, diabetes, apolipoproteins, and cardiac causes were more associated with ischaemic stroke ($p<0{\cdot}0001$).[22] In an epidemiological study it was observed that diabetes mellitus appeared to be the common risk factor for ischemic stroke in Indian and Swiss population. Smoking, alcoholism and hypertension showed a significant association with ischemic stroke.[21] Our study showed that majority of the patients had MCA lesions and these findings are similar to earlier reports that show MCA territory to be the most common territory involved in stroke patients. For example in a study done by Won Chung et al, MCA (middle cerebral artery) was the most frequently involved territory (49.6%). In our study, 62 % of patients had hemiparesis, Some of the earlier reports have described a higher percentage of patients with hemiparesis. [23] For instance, in the study by Bansal et al, hemiparesis was observed in 79.2% of the subjects.[24]

CVT was seen in 15 patients (30%). This does not concur with the study by Venkataraman et al where incidence was 4.3%. Bousser et al trial suggests that the true incidence is much higher than that thought from autopsy series. Cardiac source of emboli was observed in 9.75% of cases.[25,26] In the study conducted by P.M.Dalal et al, the incidence of cardiac source of emboli was 20% .[27] In our study, 6% of the patients had atrial fibrillation. In the oxford shire community stroke project, the incidence of atrial fibrillation was 17%.[28]

CONCLUSION

This was one of the few studies done among young patients with stroke in a tertiary hospital in India. The majority of the age distribution of both ischemic and hemorrhagic stroke in this study was between the ages of 36-45 years. Ischemic stroke was common in younger age group (21-30years). Among clinical features decrease in consciousness, seizure and motor deficit were prominent. Hemiparesis was common than hemiplegia in young adults. Pro-thrombotic state was the most common etiology for stroke in young. Cortical venous thrombosis more common in young females. Diagnostic challenges are to be expected when evaluating these patients. Although the pro-thrombotic state was less common previously, it is emerging as the common cause among young individuals probably because of advancing diagnostic modalities available to identify inherited deficiencies.

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