

# Clinical Profile of Stroke among Young Adults

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## ABSTRACT

**Introduction:** Stroke was defined 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. In general Stroke in young includes subjects falling under the age group of 15-45 years. The aetiology may vary with different age groups but certain factors are confined to the young. The present study was undertaken to study the aetiology, risk factors, clinical presentation and radiological profile of stroke in young.

**Material and methods:** This is a prospective descriptive and Clinical study. 50 cases of young adults With stroke admitted in Department of Medicine Government General Hospital, Guntur, AP, during the period Oct 2016 - Sep 2017 were included.

**Results:** Males are more affected than females. Majority of strokes occurred between the ages of 36-40 years. Most common risk factor associated with stroke is smoking. Most common presentation is with motor deficit. Most common CT scan finding is arterial infarction.

**Conclusions:** Atherosclerosis was the most common aetiology for stroke in young. cortical venous thrombosis should be kept in mind in young females. smoking and alcohol consumption were important acquired risk factors for stroke among young.

**Keywords:** Stroke, Atherosclerosis, Ischaemia

## INTRODUCTION

Stroke is one of the most important causes of high morbidity and mortality all over the world. 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<sup>1</sup>. The diseases of cerebral blood vessels and the related infarcts and hemorrhages, though principally occur in the elderly, the young are not spared.

The Community based surveys from the West and Japan indicate average annual incidence of stroke as 111-180/1,00,000 general population and 9-28/1,00,000 in young people below the age of 45 years. Data from major Indian hospitals show 24 to 35% of strokes in young of all neurological admissions. Although various studies on stroke in young included subjects from second to fourth or fifth decade, in general, stroke in young includes subjects falling under the age group of 15-45 years<sup>2</sup>. Aetiology may vary with different age groups, but most of the risk factors are common to all age groups. Still, certain factors are confined to the young.

Stroke affecting the young has potentially devastating consequences on the individual, his family and the society

in general.

The present study was undertaken to study the aetiology, risk factors, clinical presentation and radiological profile of stroke in young.

## MATERIAL AND METHODS

A Prospective descriptive and clinical study was conducted on patients diagnosed to have stroke in young admitted in Department of Medicine Government General Hospital, Guntur, AP from October 2016 to September 2017 and fulfilled the inclusion and exclusion criteria. The sample size was restricted to 50 cases.

### Inclusion Criteria

1. Age 15 - 45 years.
2. Patients with abrupt onset of focal or global neurological deficit attributable to vascular cause and persist for more than 24 hours.

### Exclusion Criteria

1. Head injurbny

### Method of Collection of Data

All patients who have fulfilled the inclusion and exclusion criteria were included in this study. A Proforma was prepared which included detailed history, clinical examination and requisite investigations available in our hospital. History includes all symptoms pertaining to stroke in detail with emphasis on all the risk factors attributable to the stroke in young. 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 head, lumbar puncture for CSF analysis and electrocardiography were done for all patients, bleeding time, clotting time, test for HIV, and echocardiogram were done for the required patients. The results were analyzed to assess the aetiology, risk factors, and the pattern of clinical and radiological profile. The consent was taken from the patients or attendants who were included in the study, for performing the necessary investigations or procedures.

## STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descripve

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statistics were used for the interpretation of data. A total of fifty patients, 29(59%) males and 21(42%) females diagnosed to have stroke were included in the study. Our study found that mean age of the study group was  $31.92 \pm 8.59$  years and that of male and female patients was  $33.65 \pm 7.63$  and  $29.67 \pm 9.51$  years respectively. The majority of strokes occurred between the ages of 36-40 years at 24% and 34.5% of male were also in the same age group, whereas in females it was in the ages between 21-25 years at 28.6%. (Table 1)

Patients had a number of clinical features in our study. 14% [90% CI (7.77-23.92%)] of the study population presented with seizures. Decrease in consciousness was seen in 60% [90% CI (48.38-70.60%)] of patients. 34% [90% CI (24.06-45.59%)] of patients had speech abnormalities. The most common cranial nerve affected was the facial nerve in 56% [90% CI (44.40-66.94%)], 6% [90% CI (2.42-14.09%)] of the patients had the oculomotor nerve affected and 2% [90% CI (0.5-8.48%)] of the study group had other cranial nerve palsies. Motor deficit was seen in all the patients. Hemi paresis, hemiplegia and monoparesis were seen in 86% [90% CI (76.08-92.23%)], 12% [90% CI (6.33-21.57%)] and 2% [90% CI (0.5-8.48%)] of the study group respectively. Hemi sensory loss was seen in 14% [90% CI (7.77-23.92%)] of the study group. Only 2% [90% CI (0.5-8.48%)] of the patients had cerebellar deficit. (Table 2)

Multiple risk factors were analyzed in our study (Table 4). 36% [90% CI (25.82- 47.62%)] of all the patients were smokers and among ischaemic and hemorrhagic strokes 35.9% and 36.4% ( $P > 0.05$ ) were smokers respectively. Alcohol consumption was seen in 30% [90% CI (20.59-41.46%)] of patients and among ischaemic strokes 28.2% and hemorrhagic strokes 36.4% ( $P = 0.713$ ). 12% [90% CI (6.33-21.57%)] of the study group was overweight. Among ischaemic strokes 15.4% whereas none of the hemorrhagic strokes were overweight ( $P=0.317$ ). Diabetes mellitus was seen in 24% [90% CI (15.57-35.10%)] of patients. 28.2% of ischaemic strokes were diabetic whereas 9.1% of hemorrhagic strokes had the same disease ( $P=0.257$ ). Hypertension and CAD were seen in 32% [90% CI (22.31-43.53%)] and 18% [90% CI (10.78- 28.50%)] of the study group respectively. Among ischaemic strokes 15.4% ( $P < 0.001$ ) were hypertensive and 20.5% ( $P=0.662$ ) had CAD. Whereas among hemorrhagic strokes 90.9% ( $P<0.001$ ) had hypertension and 9.1% ( $P = 0.662$ ) had CAD. Transient ischaemic attacks and previous family history of stroke were both seen in 2% [90% CI (0.5-8.48%)] of the study group. 2.6% ( $P>0.05$ ) of ischaemic strokes also had the same, none of the hemorrhagic strokes had this history. 4% [90% CI (1.33-11.39%)] of patients were taking oral contraceptive pills. 2.6% and 9.1% ( $P=0.395$ ) of ischaemic and hemorrhagic strokes were taking the same. homocystine levels were seen elevated in 12% [90% CI (6.33-21.57%)] of patients, 15.4% ( $P=0.317$ ) ischaemic strokes had homocystinemia, none of the hemorrhagic strokes had this risk factor. (Table 3) Dyslipidemia was also investigated LDL and HDL were abnormal in 60% [90% CI (48.38-70.60%)] and 72% [90%

| Age in years  | Female           |       | Male             |       | Combined         |       |
|---------------|------------------|-------|------------------|-------|------------------|-------|
|               | No               | %     | No               | %     | No               | %     |
| 16-20         | 4                | 19.0  | 1                | 3.4   | 5                | 10.0  |
| 21-25         | 6                | 28.6  | 5                | 17.2  | 11               | 22.0  |
| 26-30         | 3                | 14.3  | 6                | 20.7  | 9                | 18.0  |
| 31-35         | 2                | 9.5   | 3                | 10.3  | 5                | 10.0  |
| 36-40         | 2                | 9.5   | 10               | 34.5  | 12               | 24.0  |
| 41-45         | 4                | 19.0  | 4                | 13.8  | 8                | 16.0  |
| Total         | 21               | 100.0 | 29               | 100.0 | 50               | 100.0 |
| Mean $\pm$ SD | 29.67 $\pm$ 9.51 |       | 33.65 $\pm$ 7.63 |       | 31.92 $\pm$ 8.59 |       |

Table-1: Age and sex distribution

| Clinical features     | Number | %    | 90% CI      |
|-----------------------|--------|------|-------------|
| Seizures              |        |      |             |
| Absent                | 43     | 86.0 | 76.08-92.23 |
| Present               | 7      | 14.0 | 7.77-23.92  |
| Consciousness         |        |      |             |
| Normal                | 20     | 40.0 | 29.40-51.62 |
| Decreased             | 30     | 60.0 | 48.38-70.60 |
| Speech                |        |      |             |
| Normal                | 18     | 36.0 | 25.82-47.62 |
| Dysphasia             | 17     | 34.0 | 24.06-45.59 |
| Could not be Examined | 15     | 30.0 | 20.59-41.46 |
| Cranial Nerve deficit |        |      |             |
| Normal                | 18     | 36.0 | 25.82-47.62 |
| Oculomotor            | 3      | 6.0  | 2.42-14.09  |
| Facial                | 28     | 56.0 | 44.40-66.94 |
| Multiple              | 1      | 2.0  | 0.5-8.48    |
| Motor deficit         |        |      |             |
| Hemiparesis           | 43     | 86.0 | 76.08-92.23 |
| Hemiplegia            | 6      | 12.0 | 6.33-21.57  |
| Monoparesis           | 1      | 2.0  | 0.5-8.48    |
| Sensory deficit       |        |      |             |
| Normal                | 43     | 86.0 | 76.08-92.23 |
| Hemi sensory loss     | 7      | 14.0 | 7.77-23.92  |
| Cerebellar deficit    |        |      |             |
| Absent                | 49     | 98.0 | 91.52-99.55 |
| Present               | 1      | 2.0  | 0.5-8.48    |

Table-2: Clinical features of stroke

CI(60.64- 81.11%)] of patients respectively. 61.5% of ischaemic strokes and 54.5% of hemorrhagic strokes had abnormal LDL ( $P=0.736$ ) whereas 74.4% of ischaemic strokes and 63.6% of hemorrhagic strokes had abnormal HDL ( $P =0.476$ ). 78% [90% CI (67.07-86.06%)] of all the strokes were ischaemic where as only 22% [90% CI (11.94-32.93%)] of them had hemorrhage

Aetiologies were varied Atherosclerosis was seen in 32% [90% CI (22.31-43.53%)] of patients. Cortical Venous thrombosis in 9(18%) [90% CI (10.78-28.50%)] patients all of them were women. All but one was in a post partum state. There was a single case of antiphospholipid antibody syndrome. Tubercular meningitis, Rheumatic Heart disease and Systemic lupus erythematosus were seen in 12% [90% CI (6.33-21.57%)], 10% [90% CI (4.95-19.15%)] and 4% [90% CI (1.33-11.39%)] of patients respectively. One each of ischaemic and hemorrhagic strokes was undiagnosed [90% CI (0.5-8.8%)].

CT scan findings showed 60% [90% CI (48.38-70.60%)]

| Risk factors             | Number (n=50) | %    | 90% CI      |
|--------------------------|---------------|------|-------------|
| Smoking                  |               |      |             |
| Absent                   | 32            | 64.0 | 52.38-74.18 |
| Present                  | 18            | 36.0 | 25.82-47.62 |
| Alcohol                  |               |      |             |
| Absent                   | 35            | 70.0 | 58.54-79.41 |
| Present                  | 15            | 30.0 | 20.59-41.46 |
| BMI                      |               |      |             |
| Under weight             | 11            | 22.0 | 13.94-32.93 |
| Normal                   | 33            | 66.0 | 54.41-75.94 |
| Over weight              | 6             | 12.0 | 6.33-21.57  |
| Diabetes Mellitus        |               |      |             |
| Absent                   | 38            | 76.0 | 64.90-84.43 |
| Present                  | 12            | 24.0 | 15.57-35.10 |
| Hypertension             |               |      |             |
| Absent                   | 34            | 68.0 | 56.47-77.69 |
| Present                  | 16            | 32.0 | 22.31-43.53 |
| CAD                      |               |      |             |
| Absent                   | 41            | 82.0 | 71.50-89.22 |
| Present                  | 9             | 18.0 | 10.78-28.50 |
| TIA                      |               |      |             |
| Absent                   | 49            | 98.0 | 91.52-99.55 |
| Present                  | 1             | 2.0  | 0.5-8.48    |
| Family history of stroke |               |      |             |
| Absent                   | 49            | 98.0 | 91.52-99.55 |
| Present                  | 1             | 2.0  | 0.5-8.48    |
| OCP                      |               |      |             |
| Absent                   | 48            | 96.0 | 88.61-98.67 |
| Present                  | 2             | 4.0  | 1.33-11.39  |
| Homocystinuria           |               |      |             |
| Absent                   | 44            | 88.0 | 78.43-93.67 |
| Present                  | 6             | 12.0 | 6.33-21.57  |

**Table-3:** Risk factors associated with stroke

| CT scan findings  | Number | %    | 90% CI      |
|-------------------|--------|------|-------------|
| Infarct           | 30     | 60.0 | 48.38-70.60 |
| Venous thrombosis | 9      | 18.0 | 10.78-28.50 |
| Hemorrhagic       | 11     | 22.0 | 13.94-32.93 |

**Table-4:** CT scan findings

of patients having arterial infarction. Cortical venous thrombosis was seen in 18% [90% CI (10.78-28.50%)] of patients and intra cerebral hemorrhage was seen in 22% [90% CI (13.94-32.93%)].(Table 4)

## DISCUSSION

Our study was based in south India comprising mainly of a rural population. It should prove useful, then, for the diagnosis, management and prognosis of young stroke patients in similar areas. Sex ratio in our study was 1.3:1 (male: female). Mehndiratta MM et al<sup>3</sup> showed a ratio of 1:08 in North India where as Zunni et al<sup>4</sup> demonstrated a similar ratio of 1.2:1 in Africa. The mean age of all the patients in our study was 31.92 years, a study in north India by Mehndiratta MM et al<sup>3</sup> showed a similar mean age of 31.97 years. The mean ages of males and females were 30.66 and 33.28 years. Our study had a markedly higher mean age group among men at 33.65 years whereas among women it was much lower at 29.67 years probably because there were

more number of females in the present study who presented with CVT in early age.

Nagaraja et al<sup>5</sup> had showed an incidence of smoking associated with stroke to be 15% Dalal et al<sup>6</sup> 40%, Bogousslavsky et al<sup>7</sup> 36.6% and Alvarez et al<sup>8</sup> 56.7%. In meta analysis of 32 separate studies of relation between smoking and stroke analysed by Roger Shunton and Beevers<sup>9</sup> there was a strong association between smoking and incidence of stroke. Our study showed 36%. In the study of Nagaraja et al the frequency of alcohol consumption was 15%, Alvarez et al<sup>8</sup> 37.8% and Dalal et al<sup>6</sup> 40%, the present study had 30%. In study by Nagaraja et al<sup>5</sup> the incidence of diabetes was 11%, Dalal et al<sup>6</sup> 20%, Grindal et al<sup>10</sup> 5.2%, Zunni et al<sup>4</sup> 14.8% and Alvarez et al<sup>8</sup> 10.9%, where as in our study it was 24%. In the present study 16 patients (32%) had hypertension Dalal et al<sup>6</sup> showed an incidence of 46.7%, Alvarez et al<sup>8</sup> 23%, Nagaraja et al<sup>5</sup> 22.6% and Grindal et al<sup>10</sup> 17.2%. With respect to CAD Grindal et al<sup>10</sup> showed a frequency of 26%, Alvarez et al<sup>8</sup> 3.9%, our study showed 18%. In the study by Bogousslavsky et al<sup>7</sup> the incidence of TIA was 17.1% where as 3% in Mehndiratta MM et al<sup>3</sup> which concurred with our study of 2%. In a study by Grindal et al<sup>10</sup> the incidence of OCP's leading to stroke was 17.9% where as in our study it was 4% possibly because of the rural population. In the study by Mehndiratta MM et al<sup>3</sup> incidence of homocysteine was 0.9%. Present study showed 12% which did not concur with the above study probably because the levels of homocysteine can elevate temporarily after stroke, so it should be measured again after 8 weeks. In the present study homocysteine was measured during presentation of stroke.

In the present study smoking was present in 35.9% of ischaemic strokes and 36.4% of hemorrhagic strokes where as it was 18.11% and 4.72% in ischaemic and hemorrhagic strokes respectively in Mehndiratta et al.<sup>3</sup> In the study by Alvarez et al<sup>8</sup> it was present in 56.74% of ischaemic stroke. Special hematological investigations like antithrombin III, protein C, protein S deficiencies and angiographic studies could not be done in the present study. Evaluations of various risk factors of stroke in young are important as they may play a major role in predisposing an individual to a disease which has terrible impact on the family and society. Stroke in young deserves an extensive evaluation that includes hematological, biochemical and angiographic studies. By these approaches a large number of potential causes can be detected and the treatment of these patients can be tailored according to the outcome.

## CONCLUSION

The majority of the age distribution of stroke in this study was between the ages of 36-40 years, and it was the same among males. However it was lower in females at 21-25 years. Atherosclerosis was the most common etiology for stroke in young. Cortical Venous thrombosis should be kept in mind in young females. Smoking and alcohol consumption were important acquired risk factors for stroke among young. Hypertension and Diabetes mellitus were non modifiable risk factors commonly seen, especially hypertension in

cases of intracerebral hemorrhage. Among clinical features decrease in consciousness and motor deficit were prominent. Rarer risk factors like homocystinemia should be considered during evaluation. Dyslipidemia in the form of elevated LDL and decreased HDL were also common. Diagnostic challenges are to be expected when evaluating these patients.

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