Section: Neurology

Original Research Article

# CLINICAL AND ANGIOGRAPHIC PROFILE OF STROKE IN YOUNG ADULTS IN A TERTIARY CARE HOSPITAL

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## Abstract

**Background:** A change in life style pattern led to epidemic of traditional risk factors in younger population, and although large vessel extra and intracranial atherosclerotic disease, small vessel atherosclerosis and atrial fibrillation have a major role in cases of stroke in older adults, these disorders are comparatively less frequent in young adults. It is well established that incidence of risk factors and etiology in young adults differ notably from patients. Few authors have reported a higher frequency of young stroke patients in India and in South Asia than in western countries 1. Patients from India and South Asia were also found to be younger than the stroke patients from in western countries 2. The study group of acute ischemic stroke in young patients in a tertiary care hospital provides an ideal population to comprehensively evaluated in stroke unit. **Materials and Methods:** Patients admitted in the stroke unit, at the Neurology department of Madurai Medical college, Madurai. Aged 15-50 years with ischemic stroke and who have undergone at least one standard vessel imaging procedure within 2 weeks of stroke onset. The study is conducted between January 2022 to January 2023. **Results:** Patients included in study are 310. The mean age of study population is 38.7 years and the youngest patient is 16 years, eldest is 50 years. Hypertension and smoking were the most common vascular risk factors occurred in more than one fourth of the patients. Diabetes mellitus and alcoholism are also noted in a significant proportion of patients. It is noteworthy that the number of patients who had a prior vascular event (stroke /TIA) was 88. Thus almost 28 % patients had a history of past stroke /TIA before presentation. Around 15 % of patients had history of valvular heart disease and 6.1 % had a prosthetic valve. Around 5.8 % patients had atrial fibrillation .9% patients had coronary artery disease. **Conclusion:** Considering the ever increasing burden of stroke and the profound economic and social consequences in young population it is essential that etiological diagnosis and risk factor evaluation is complete .This helps not only in planning treatment and secondary prevention strategies but also assumes significance for rehabilitation .There are very few studies from India focusing on the risk factors and angiographic profile of stroke in young adults and we report one of the largest of such studies.

## INTRODUCTION

A change in life style pattern led to epidemic of traditional risk factors in younger population, and although large vessel extra and intracranial atherosclerotic disease, small vessel atherosclerosis and atrial fibrillation have a major role in cases of stroke in older adults, these disorders are comparatively less frequent in young adults. It is well established that incidence of risk factors and etiology in young adults differ notably from patients. Few authors have reported a higher frequency of young stroke patients in India and in South Asia than in western countries.[1] Patients from India and South Asia were also found to be younger than the stroke patients from in western countries.[2] Understanding the exact cause of stroke in the young has great relevance to its prevention and management. Recent advances in the surgical and interventional management of extra cranial and intra cranial vascular disease have made it necessary to correctly identify the causative as well as contributory factors of stroke.[9]


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The study group of acute ischemic stroke in young patients in a tertiary care hospital provides an ideal population to comprehensively evaluated in stroke unit.

**Aims and objectives**

To study the clinical and angiographic profile with ischemic stroke in the age group 15-50 years.

## MATERIALS AND METHODS

Patients admitted in the stroke unit , at the Neurology department of Madurai Medical college ,Madurai .Aged 15-50 years with ischemic stroke and who have undergone atleast one standard vessel imaging procedure with in 2 weeks of stroke onset .The study is conducted between January 2022 to January 2023 .

**Inclusion Criteria**

Age 15-50 years, consecutive acute ischemic stroke, digital subtraction angiography /CT Angiography /MR Angiography /Neck vessel Doppler completed within 2 weeks of stroke onset.

**Exclusion Criteria**

Hemorrhagic stroke, venous sinus thrombosis, sub arachnoid hemorrhage.

**Methods**

All patients who fulfill the inclusion criteria are included in the study.All patients provided serum samples on hospital admission .The clinical and sociodemograhical data ,as well as data on vascular risk factors and treatment were obtained from the case records .

Design Cross section observational study

**Statistical Analysis**

A descriptive analysis of the demographic ,clinical and angiographic characteristics.Also an inter modality comparison between the various angiographic imaging modalities is attempted .The data was analysed using statistics software ( SPSS Inc ., Illinois ,Chicago) .The statistical analysis was done with the help of the Medical statistics Expert of the Institute .We summarized the quantitative data with the mean,median,mode and standard deviation measurements whereas the qualitative data or categorical variables will be summarized using percentages .To determine whether the angiographic profile is associated with certain clinical features /demographic features ,we used tests for statistical significance ,like the Chisquare test for comparing percentages and the T test for comparing mean value.

## RESULTS

**Table 1: Gender distribution in young stroke patients**

| Sex | Frequency | Percentage |
|---|---|---|
| Males | 213 | 68.7 |
| Females | 97 | 31.3 |
| Total | 310 | 100 |

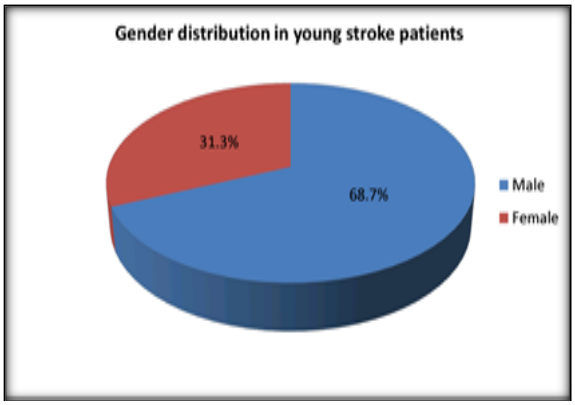


**Figure 1**

**Table: 2 Age distribution of the patients**

| Age | Frequency | Percentage |
|---|---|---|
| < = 20 | 11 | 3.5 |
| 21.0-25.0 | 19 | 6.1 |
| 26.0-30.0 | 25 | 8.1 |
| 31.0-35.0 | 38 | 12.3 |
| 36.0-40.0 | 59 | 19.0 |
| 41.0-45.0 | 84 | 27.1 |
| 46.0-50.0 | 74 | 23.9 |
| Total | 310 | 100 |

The mean age of study population is 38.7 years and the youngest patient is 16 years ,eldest is 50 years .


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**Table: 3 Risk factor profile of patients**

| Risk Factor | Frequency | Percentage |
|---|---|---|
| Hypertension | 85 | 27.4 |
| Diabetes | 53 | 17.1 |
| Hyperlipidemia | 23 | 7.4 |
| Smoking | 85 | 27.4 |
| Alcoholism | 67 | 21.6 |
| Prior stroke | 62 | 20 |
| H /o prior TIA | 26 | 8.4 |
| Prior stroke /TIA | 88 | 28.4 |

Vascular risk factors for stroke in young were studied in the population which include diabetes mellitus, hypertension, dyslipidemia, smoking prior history of CAD, valvular heart disease, past stroke /TIA above table summarises the relative frequency of these risk factors.

Hypertension and smoking were the most common vascular risk factors occurred in more than one fourth of the patients.

Diabetes mellitus and alcoholism are also noted in a significant proportion of patients.

It is noteworthy that the number of patients who had a prior vascular event (stroke /TIA) was 88. Thus almost 28 % patients had a history of past stroke /TIA before presentation. showed in image 2.

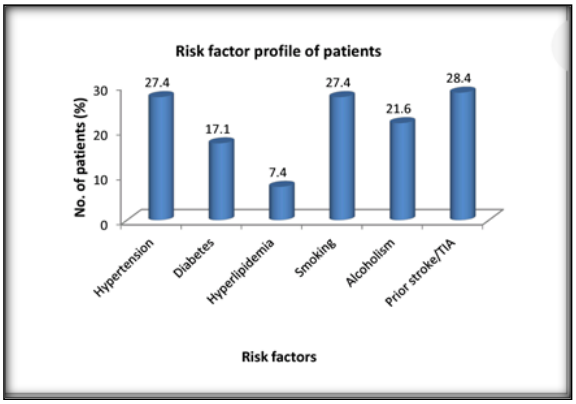


**Figure: 2**

**Table: 4 Systemic risk factor profile**

| Risk factor | Frequency | Percentage |
|---|---|---|
| CAD | 28 | 9 |
| Valvular heart disease | 46 | 14.8 |
| Prosthetic valve | 19 | 6.1 |
| AF | 18 | 5.8 |

Around 15 % of patients had history of valvular heart disease and 6.1 % had a prosthetic valve. Around 5.8 % patients had atrial fibrillation .9% patients had coronary artery disease. and showed in image – 3.

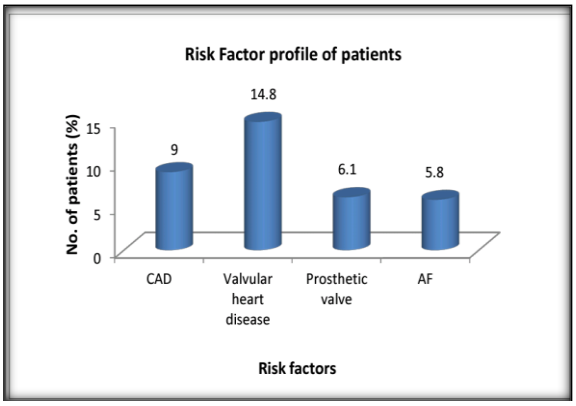


**Figure: 3**

**Table: 5 Final clinical impression**

| Final impression | Frequency | Percentage |
|---|---|---|
| Right hemispheric | 104 | 33.5 |
| Left hemispheric | 125 | 40.3 |
| Posterior circulation | 65 | 21 |
| Undetermined | 16 | 5 |
| Total | 310 | 100 |

Based on clinical presentation patients were classified as right hemispheric /left hemispheric /posterior circulation or undetermined territory. Clinical suspicion of left hemispheric stroke was noted in most of the patients and in about 20 % presented with clinical picture suggestive of a posterior circulation involvement as shown in the above table.


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**Table: 6 Age wise distribution of risk factors**

| | Age <35( N=93) | | >35( N=217) | | Total | | Chi square | Df | P |
|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | | | |
| Hypertension | 7 | 7.5 | 78 | 35.9 | 85 | 27.4 | 26.417 | 1 | <0.001 |
| Diabetes | 4 | 4.3 | 49 | 22.6 | 53 | 17.1 | 15.347 | 1 | <0.001 |
| Current smoking | 12 | 12.9 | 61 | 28.4 | 73 | 23.7 | 8.590 | 1 | 0.003 |
| Valvular heart disease | 20 | 21.5 | 26 | 12 | 46 | 14.8 | 4.673 | 1 | 0.031 |
| hyperlipidemia | 2 | 2.2 | 21 | 9.7 | 23 | 7.4 | 5.369 | 1 | 0.020 |
| Atrial fibrillation | 2 | 2.2 | 16 | 7.4 | 18 | 5.8 | 3.247 | 1 | 0.072 |
| Prior stroke (Y/N) | 15 | 16.2 | 52 | 24 | 67 | 21.6 | 2.358 | 1 | 0.125 |
| Prior TIA( Y/N) | 9 | 9.7 | 18 | 8.3 | 27 | 8.7 | 0.692 | 2 | 0.156 |

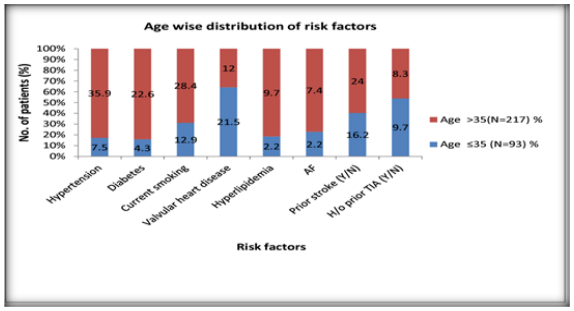


**Figure 4**

The proportion of diabetes mellitus, hypertension, dyslipidemiaand smoking was significantly higher in the older age group, whereas the valvular heart disease wassignificantly more common in the younger age group.

The number of patients with history of prior stroke /TIA was not significantly different between the two age groups.

Above table shows the presence of these risk factors according to age groups. showed in image -4.

## DISCUSSION

Considering the ever increasing burden of stroke and the profound economic and social consequences in young population it is essential that etiological diagnosis and risk factor evaluation is complete .This helps not only in planning treatment and secondary prevention strategies but also assumes significance for rehabilitation .There are very few studies from India focusing on the risk factors and angiographic profile of stroke in young adults and we report one of the largest of such studies .

Has been noted in previous studies from the subcontinent a higher male predominance is observed in our study. Similar findings have been noted in previous studies.[3,4,5] and is also related to the social and cultural factors .

The number of patients who were more than 35 years of age constituted almost 70 % of the total patients highlighting the age related increase in incidence of stroke. Also the gender difference were less prominent at younger age group than in the older age group. This is consistent with the previous studies some of which have describef even higher incidence of stroke in females.[6]

Of the commonly studied vascular risk factors hypertension, smoking, diabetes, dyslipidemia and CAD the most commonly noted were smoking and hypertension.

The age wise analysis of the vacular risk factors revealed statistically significant higher occurrence of diabetes mellitus, hypertension, dyslipidemia and smoking in patients > 35 years age .

Valvular heart disease was also noted in higher proportion of patients as compared to other studies and this may be because of referral bias as our hospital also serves as a major tertiary referral center for cardiology services. -

More than 25 % patients had a history of past stroke /TIA. This high proportion highlights the importance of prope initial evaluation in young patients with first ever ischaemic event. Proper etiological work up and stringent secondary prophylaxis strategies are essential.[10]

Anterior circulation stroke predominated in our study whch was consistent with results from other young stroke studies. The proportion of left hemispheric strokes was higher than right has been previously noted by many authors.[7,8] This may be because of the difficulty in identifying right hemispheric defects.[7,8]

This is one of the largest studies from the subcontinent which focuses on the angiographic profile in young stroke. The main strength lies in the fact that all 310 patients underwent some form of angiographic assessment of the intracranial as well as extracranial vasculature work up.

## CONCLUSION

The high proportion of patients with past history of stroke /TIA highlights the need for better secondary prevention strategies. The conventional vascular risk factors shift towards the ‘older population’ pattern after 30-50 years of age and patients who are < 35 years of age should be actively evaluated for ever the rare causes of stroke in young.

Arterial dissections are fairly common in youg population and should be considered in appropriate clinical setting and all patients should have a good and timely angiographic assessment to rule out dissections .Revascularisation strategies ( like carotid endarterectomy /stenting ) are now easily available for extrcranial large vessel atherosclerotic disease and patient eligibility should be screened for Thus ,this study highlights the importance of risk factor evaluation ,and control,complete etiological


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evaluation angiographic assessment in the diagnosis ,management and planning of secondary prevention strategies in young patients with stroke .

Ethical clearence

Ethical clearance obtained from the institution.

Conflicts of interest

There are no conflicts of interest.

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