



CLINICAL PROFILE AND OUTCOME OF ACUTE ISCHEMIC STROKE IN YOUNG PATIENTS: A HOSPITAL BASED CROSS SECTIONAL STUDY

General Medicine

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ABSTRACT

Objectives: This study was planned to study risk factors amongst young adults for ischemic stroke in Bundelkhand region of India and disability caused by it. **Methods:** Data was collected of the 100 consecutive patients presenting with acute ischemic stroke, aged between 15 and 45 years at emergency, medicine and neurology departments (Sept. 2021- Oct. 2022). The diagnosis was based on acute onset focal neurological deficits lasting more than 24 hours with evaluation of associated neuroimaging. Structured proforma was used to note the clinical and radiological (CT head) details. TOAST (the trial of ORG 10172 in acute stroke treatment) classification was used to define stroke subtype, severity and possible etiology as following. 1) large artery atherosclerosis; 2) cardio embolism; 3) small vessel disease; 4) stroke of other determined etiology; 5) stroke of undetermined etiology. The outcome was assessed using modified Rankin scale. Favorable outcome was defined as score 0-2 and unfavorable outcome at score more than 2 (3-6). **Results:** Patients mean age was 36.91±5.79, and most were males. Smoking was the most significant risk factor. Undetermined etiology was the most prevalent TOAST stroke subtype. 85% of patients had Modified Rankin Scale scores of 0-2. **Conclusions:** Smoking, hypertension, atrial fibrillation and dyslipidemia are important risk factors for ischemic stroke in young adults. Undetermined etiology is most common stroke type (the predilection is statistically significant for age group of 15-35 as compared to 36-45), may indicate that further detailed and technologically advanced work up is required for evaluation of stroke in younger group.

KEYWORDS

Dyslipidemias, Embolism, Humans, Ischemic Stroke, Risk Factors

INTRODUCTION

Stroke has been responsible for around 6.2 million fatalities (almost 11 percent of the total)¹, and its frequency is expected to grow by the year 2050.² Around 10–14% of ischemic strokes manifest in the young adult population.³ Developing nations bear two-thirds of the worldwide stroke burden, and stroke patients are 15 years younger when compared to developed countries.⁴ Acute ischemic stroke is a significant health concern, particularly among young patients. Adequate understanding of the risk factors associated with this condition is crucial in preventing its burden and recurrence.⁵ The aim of this study was to identify the clinical profile, risk factors and etiological subtype of acute ischemic stroke in young individuals residing in the Bundelkhand area, using the TOAST (Trial of Org 10172 in Acute Stroke Treatment). In addition, the Modified Rankin Scale was utilized to assess the outcome of the stroke.

MATERIAL AND METHODS

This observational study, conducted in a hospital setting, involved the inclusion of 100 patients aged 15 to 45 years who presented to the emergency unit of the Department of Medicine and Neuromedicine between September 2021 and September 2022. These patients were diagnosed with acute ischemic stroke within 48 hours of symptom onset, as determined by a thorough workup. The sample size of 100 cases was selected using purposive sampling method. The inclusion criteria were met and informed consent was obtained from the participants.

Inclusion Criteria

Subjects between 15 years to 45 years of age. Diagnosis of acute ischemic stroke based on clinical evaluation and imaging (computed tomography [CT]-head) within 48 hours onset of symptoms.

Exclusion Criteria

Patient below 15 years of age and above 45 years, Evidence of hemorrhage in CT scan, Past traumatic of stroke, who have posttraumatic, drug-induced (e.g., anticoagulant-induced), and those with bleeding diathesis related etiologies, ICSOL, malignancy, with stroke-like conditions due to systemic diseases such as infection.

A comprehensive medical history was obtained and a meticulous physical examination was conducted for each individual. Data from a

thorough history encompassed a range of demographic variables such as age, gender, medical history of transient ischemic attack/stroke, hypertension, diabetes mellitus, heart disease, and substance abuse. The data was obtained subsequent to obtaining the patient's informed consent. Standard hematological and biochemical analyses were conducted, encompassing measurements of hemoglobin levels, serum urea and creatinine concentrations, blood glucose levels, and lipid profiles. A computed tomography (CT) scan was performed with the purpose of ruling out the presence of intracranial hemorrhage (ICH). The classification of stroke type was based on the results of a brain computerized tomography (CT) scan conducted within 48 hours of the stroke's onset. Structured proforma was used to note the clinical and radiological (CT head) details. TOAST (the trial of ORG 10172 in acute stroke treatment) classification was used to define stroke subtype, severity and possible etiology as following. 1) large artery atherosclerosis; 2) cardio embolism; 3) small vessel disease; 4) stroke of other determined etiology; 5) stroke of undetermined etiology.⁵ Upon the patient's discharge from the medical facility, an assessment of the Modified Rankin Scale (mRS) was conducted to evaluate the outcome of the patients. The scale assesses the level of disability and performance in activities of everyday life. Favorable outcome was defined as score 0-2 and unfavorable outcome at score more than 2 (3-6).⁶ In order to conduct the investigation on the etiological classification of the disease, the group of participants was split into two categories based on age: 15–35 years and 36–45 years.

In the descriptive analysis of the data, categorical variables were analyzed using frequency and proportions. The chi-square test and Fisher's exact test were employed as appropriate to establish the presence of associations between categorical variables. At a confidence level of 95%, a p-value less than 0.05 was deemed statistically significant. The data was initially entered into Microsoft Excel 2021 Office Version and subsequently analyzed using Statistical Package for the Social Sciences (SPSS for Windows, version 22.0).

RESULTS

The study involved the collection of data over a one-year period, specifically from September 2021 to October 2022. The sample size was limited to 100 patients who presented with acute ischemic stroke within 48 hours of onset and were between the ages of 15 and 45.

The mean age of the patients in our study is 36.91 ± 5.79 years. Majority of the cases (70.0%) were found to be in the 36-45 years of age group. Male predominance was seen in the study with 84.0% of cases being male. The study revealed that smoking (46.0%) was the most significant risk factor, subsequently followed by hypertension (30.0%). The predominant clinical manifestation observed in our study was motor weakness, which was evident in 95% of the cases. The predominant TOAST subtype observed in the study was undetermined, accounting for 32% of the cases, in which majority (68.75%) cases were in the age group of 15 to 35 years. This difference was statistically significant with p value $< .00001$. In accordance with the modified Rankin scale scoring system, 85 (85%) of patients in our study had a score of 0-2 considered favourable whereas 15 (15%) patients had a score of 3-6, amounting to an unfavorable outcome.

Table 1: Demographic Features Of Acute Ischemic Stroke Patients In The Study (N=100)

Age group (in years)	N (%)
15-35	30(30)
36-45	70(70)
Sex	
Male	84(84)
Female	16(16)
Symptoms*	
Right Hemiparesis	60(60)
Dysarthria	40(40)
Aphasia	36(36)
Left Hemiparesis	35(35)
Facial Palsy	22(22)
Headache	12(12)
Vomiting	10(10)
Loss of consciousness	6(6)

*Not Mutually Exclusive

Table 2. Distribution Of Cases According To Risk Factors And Outcome (n=100)

Risk factors*	No. of cases	Percentage
None	18	18.0
Smoking	46	46.0
Hypertension	30	30.0
Dyslipidemia	22	22.0
Diabetic	12	12.0
Hyperhomocystenemia	14	14.0
Atrial fibrillation	26	26.0
Valvular heart disease	8	8.0
MRS score	No. of patients	Percentage
0-2	85	85.0
3-4	8	8.0
4-6	7	7.0

*Not Mutually Exclusive

Table 3. Etiology By Toast Classification By Age Group (years)

S NO.	Sub Type	Age Group		P Value
		15-35 yr (30)	36-45 yr (70)	
1	Large artery atherosclerosis	2	22	<0.05
2	Cardio embolism	2	24	<0.05
3	Small vessel occlusion	1	2	$>.05$
4	Stroke of other determined aetiology	3	12	>0.05
5	Stroke of undetermined aetiology	22	10	<0.00001

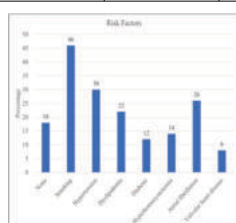


Figure 1. Distribution Of Cases According To Risk Factors (n=100)

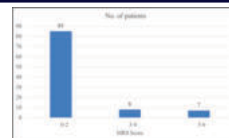


Figure 2. Distribution Of Cases According To Outcome (n=100)

DISCUSSION

Our study featured a preponderance of male participants, which is consistent with other studies in which the proportion of male patients was greater than that of females.^{7,8}

The current investigation revealed an increased frequency of acute ischemic stroke in young adult males, potentially due to socio-cultural biases in India and the higher incidence of alcohol and tobacco use among males. In our study we found the most common risk factor was smoking followed by hypertension. Two case-control studies from India which comprised ischaemic stroke in all age groups demonstrated that hypertension, diabetes, and smoking are significant risk factors for stroke in India, just as they are globally.^{9,10}

The observed pattern of risk factors in this study bears resemblance to the findings reported by Subha et al.¹¹ in Thiruvananthapuram, as well as studies conducted in Karnataka and Himachal Pradesh, where hypertension emerged as the predominant risk factor for ischemic stroke.^{12,13}

In a recent study carried out in Finland, a cohort of 1008 young stroke patients were examined to identify the most prevalent vascular risk factors. The findings revealed that dyslipidemia was the most commonly observed risk factor, affecting 60% of the participants. Smoking and hypertension were also identified as significant risk factors, with 44% and 39% of the cohort presenting with these conditions, respectively.¹⁴ According to the Helsinki Young Stroke Registry, a study analyzing 3944 young stroke patients from three distinct geographic regions, the prevalent vascular risk factors were current smoking (49%), dyslipidemia (46%), and hypertension (36%).¹⁵

In the present study, the predominant clinical manifestation observed was motor weakness (94%), which appeared in the manner of hemiparesis or hemiplegia. This result is consistent with the study by Omkar Prasad Baidya et al.¹⁶, in which 84% of patients displayed motor weakness.

The most common stroke subtype according to TOAST classification in the current study was undetermined cause, and this finding was statistically significant. Cardioembolism accounted for 25.3% of cases in a study by Sher et al.¹⁷, which revealed that it was the most frequent subtype of stroke in young patients. Deepa et al.¹⁸ conducted a study to look into the prevalence of ischemic strokes in young people. The results indicated that the most common cause of ischemic strokes was undetermined etiology, accounting for 57% of cases, followed by other determined etiologies. Putaala et al.¹⁴ conducted a study on 1008 young stroke patients aged 15-49 years in Finland. Their findings revealed that 33% of the patients had strokes of undetermined etiology, while 26% had strokes of other determined etiologies. Cardioembolism was found in 19.6% of patients, small artery occlusive disease in 13.8%, and large artery atherosclerosis was seen in 7.5% of patients in their study.

Lipska et al.¹⁹ conducted a case-control study to investigate the prevalence of different subtypes of ischemic strokes in young adults from South India. The study included 214 participants who experienced their first occurrence of ischemic stroke. The results of the study revealed that the most common subtype of ischemic stroke was cardioembolic stroke, accounting for 25.2% of the cases. This was followed by large artery atherosclerosis, which accounted for 12.6% of the cases. A prevalence rate of 11.2% was observed among the patients with ODC.

CONCLUSION

The prevalence of young stroke has been linked to a number of risk factors, including smoking, hypertension, atrial fibrillation, dyslipidaemia, and diabetes mellitus. These factors have been identified as the most common contributors to the development of this condition in younger individuals.

Undetermined aetiology is most common stroke type (the predilection is statistically significant for age group of 15-35 as compared to 36-45), may indicate that further detailed and technologically advanced work up is required for evaluation of stroke in younger group.

The majority of patients exhibited favourable functional outcomes. Hence, understanding the risk factors, clinical presentation, and radiological profile of acute ischemic stroke in young patients is crucial to preventing and managing the disease in this age group. This knowledge can aid in making informed therapeutic decisions and improving comprehension of the condition.

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