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Original Research Article

CLINICAL PROFILE AND PRESENTATION PATTERNS OF ACUTE ISCHEMIC STROKE: INSIGHTS FROM A HOSPITAL-BASED CROSS-SECTIONAL STUDY IN SOUTH INDIA

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ABSTRACT

Background: Stroke is a leading cause of morbidity and mortality worldwide, with Acute Ischemic Stroke (AIS) being the most prevalent subtype. Understanding the clinical profile and presentation patterns is crucial for improving stroke care and prevention strategies. The aim is to study the clinical profile and presentation patterns of acute ischemic stroke in a hospital-based cross-sectional study in South India.

Materials and Methods: A cross-sectional study was conducted on 100 patients diagnosed with AIS admitted to a tertiary care hospital in South India over a period of one year. Clinical data, demographic characteristics, vascular territory involvement, and associated risk factors were collected and analyzed using appropriate statistical methods.

Results: The mean age was 55.86 (±14.98) years, with a male predominance (76%). Hemiplegia/hemiparesis was the most common clinical presentation (88%). Middle cerebral artery involvement was noted in 92% of cases. Hypertension was the most prevalent risk factor (64%), significantly associated with AIS (p=0.001), followed by smoking (36%, p=0.002), alcoholism (35%, p=0.039), and dyslipidemia (18%, p=0.045). Age above 45 years and low socioeconomic status were significantly associated with stroke incidence.

Conclusion: AIS predominantly affects middle-aged to elderly males, commonly presenting with hemiparesis due to middle cerebral artery infarction. Hypertension, smoking, and alcoholism are significant modifiable risk factors. Public health measures targeting these factors are essential for stroke prevention in this region.

Keywords: Acute Ischemic Stroke. Clinical Profile. Risk Factors.

INTRODUCTION

Stroke remains a significant global health challenge, ranking as the second most common cause of death and a leading cause of disability worldwide. Each year, approximately 15 million people suffer a stroke globally, with nearly five million fatalities and five million survivors left with permanent disabilities. The burden of stroke disproportionately affects developing countries, which account for over 85% of total stroke deaths. In India, stroke accounts for a substantial share of morbidity and mortality, with an increasing incidence influenced by demographic transitions and lifestyle changes. Acute ischemic stroke (AIS), caused by sudden occlusion of cerebral arteries leading to brain tissue infarction constitutes 80-85% of all stroke cases worldwide. Its pathophysiology involves thrombosis or embolism obstructing cerebral blood flow, resulting in neuronal death and subsequent neurological deficits.[1]

The clinical spectrum of AIS varies widely depending on the vascular territory involved, ranging from hemiparesis, speech disturbances, cranial nerve involvement to altered sensorium. The Middle Cerebral Artery (MCA) is frequently implicated, representing the most common vascular territory

affected. Risk factors for AIS include non-modifiable factors such as age, sex and genetic predisposition and modifiable factors including hypertension, diabetes mellitus, smoking, alcoholism and dyslipidemia. Hypertension, in particular, emerges as the most significant modifiable risk factor, contributing to cerebrovascular remodeling, atherosclerosis progression, and ultimately vessel occlusion.[2]

Epidemiological studies indicate a higher prevalence of stroke in males and among individuals aged above 45 years. Socioeconomic factors also influence stroke incidence, with increased prevalence reported in lower-income groups, likely due to disparities in healthcare access and lifestyle. The prevalence of modifiable risk factors differs geographically, influenced by genetic, environmental and cultural factors, underscoring the need for region-specific data to inform tailored interventions.[3]

Early recognition of clinical signs and prompt management are pivotal in improving outcomes. The WHO defines stroke as the rapid development of focal neurological deficits lasting more than 24 hours or resulting in death without an apparent non-vascular cause. Transient Ischemic Attacks (TIA), characterized by transient neurological deficits, often precede stroke and warrant aggressive risk factor modification to prevent progression.[4]

Aim: To study the clinical profile and presentation patterns of Acute Ischemic Stroke in a hospital-based cross-sectional study in South India.

Objectives

1. To describe the demographic and clinical characteristics of patients presenting with acute ischemic stroke.
2. To identify the frequency and distribution of vascular territories involved in ischemic stroke.
3. To analyze the association of modifiable and non-modifiable risk factors with acute ischemic stroke among the study population.

MATERIALS AND METHODS

Source of Data: The data for this study were collected from patients diagnosed with acute ischemic stroke admitted to the Medical Ward of Government Vellore Medical College Hospital, Vellore.

Study Design: A hospital-based cross-sectional study design was employed.

Study Location: Government Vellore Medical College Hospital, Vellore, South India.

Study Duration: The study was conducted over a period of one year from August 2014 to July 2015.

Sample Size: A total of 100 patients diagnosed with acute ischemic stroke were included in the study.

Inclusion Criteria

- Patients aged between 18 and 80 years.
- Patients clinically diagnosed with ischemic stroke confirmed by neuroimaging (CT or MRI).
- Patients willing to provide informed consent for participation.

Exclusion Criteria

- Patients below 18 years and above 80 years of age.
- Patients with hemorrhagic stroke, subarachnoid hemorrhage, traumatic brain injury.
- Patients with brain neoplasms or central nervous system infections.
- Patients unwilling to participate or unable to provide consent.

Procedure and Methodology: Upon admission, all patients underwent detailed clinical evaluation, including history taking and neurological examination. A structured proforma was used to record demographics, clinical presentation and risk factor profile. Neurological status was assessed using the National Institutes of Health Stroke Scale (NIHSS). Investigations included laboratory tests and radiological imaging to confirm diagnosis and exclude stroke mimics.

Sample Processing: Blood samples were collected for routine investigations including fasting and postprandial blood sugar, lipid profile, renal function tests and coagulation profile. Urine analysis was also performed where indicated. Radiological imaging (non-contrast CT brain or MRI brain with diffusion-weighted imaging) was performed to confirm ischemic stroke and determine affected vascular territory.

Statistical Methods: Data were analyzed using appropriate statistical tools. Descriptive statistics summarized demographic and clinical characteristics. Chi-square or Fisher's exact tests evaluated associations between categorical variables, while continuous variables were analyzed using t-tests or ANOVA where applicable. A p-value of <0.05 was considered statistically significant.

Data Collection: After obtaining informed written consent from patients or their representatives, demographic details, clinical features, medical history including risk factors such as hypertension, diabetes, smoking, alcoholism and family history of stroke were documented. Data on socioeconomic status were recorded based on BG Prasad classification. The clinical diagnosis was corroborated by neuroimaging findings. Laboratory and radiological investigation results were compiled for comprehensive analysis.

RESULTS

[Table 1] presents the clinical profile and presentation patterns of 100 acute ischemic stroke patients. The mean age of the patients was 55.86 years with a standard deviation of 14.98 years, indicating a middle-aged to elderly population commonly affected by stroke. A significant male predominance was observed, with 76% being male and 24% female. The most frequent clinical presentation was hemiplegia or hemiparesis, reported in 88% of patients, reflecting the typical motor deficits in AIS. Among these, left-sided motor weakness was present

in 46% and right-sided in 42%. Cranial nerve involvement was noted in 67% of cases, and speech disturbances were found in 44%, emphasizing the variety of neurological manifestations. Altered sensorium was present in 16% of patients, while seizures and cerebellar signs were less common, occurring in 7% and 3% respectively.

Table 1: Clinical Profile and Presentation Patterns of Acute Ischemic Stroke (N=100)

Parameter	Frequency or Mean (SD)
Age (years)	55.86 (14.98)
Sex (Male:Female)	76 (76%) : 24 (24%)
Hemiplegia/Hemiparesis	88 (88%)
Left-sided motor weakness	46 (46%)
Right-sided motor weakness	42 (42%)
Cranial nerve involvement	67 (67%)
Speech disturbances	44 (44%)
Altered sensorium	16 (16%)
Seizures	7 (7%)
Cerebellar signs	3 (3%)

Table 2: Demographic and Clinical Characteristics of AIS Patients (N=100)

Characteristic	Frequency or Mean (SD)	Test of Significance Value (95% CI)	P value
Age groups			
18-30 years	7 (7%)	Reference group	-
31-45 years	15 (15%)	χ^2= 10.8 (Age group distribution)	0.001
> 45 years	78 (78%)	Significant increase in stroke incidence	
Socioeconomic status (BG Prasad classification)			
Class 5 (low income)	66 (66%)	-	-
Class 4	33 (33%)	-	-
Class 2	1 (1%)	-	-

[Table 2] focuses on demographic and broader clinical characteristics. Patients were predominantly aged over 45 years (78%), which showed a significant increase in stroke incidence compared to younger age groups 18-30 years (7%) and 31-45 years (15%) (χ^2=10.8, p=0.001). Socioeconomic evaluation using the BG Prasad classification revealed that 66% of the patients belonged to lower income groups (Class 5), with 33% and 1% in Class 4 and Class 2 respectively, suggesting a higher burden of AIS among economically disadvantaged populations.

Table 3: Distribution of Vascular Territories Involved in AIS (N=100)

Vascular Territory	Frequency (n)	Percentage (%)
Middle Cerebral Artery (MCA)	92	92%
Posterior Cerebral Artery (PCA)	4	4%
Anterior Cerebral Artery (ACA)	2	2%
MCA with PCA involvement	1	1%
MCA with ACA involvement	1	1%

[Table 3] delineates the distribution of vascular territories involved in ischemic stroke among the 100 patients. The Middle Cerebral Artery (MCA) was the most commonly involved territory, accounting for 92% of strokes, reflecting its critical role in cerebral circulation and vulnerability to ischemic events. Other territories included the Posterior Cerebral Artery (PCA) at 4%, Anterior Cerebral Artery (ACA) at 2%, and combined involvement of MCA with PCA or ACA at 1% each.

Table 4: Associations of Risk Factors with Acute Ischemic Stroke (N=100)

Risk Factor	Frequency (n, %)	Test of Significance Value (χ^2 or OR with 95% CI)	P value
Hypertension	64 (64%)	χ^2=14.8, OR=3.5 (95% CI: 1.9-6.3)	0.001
Diabetes Mellitus	26 (26%)	χ^2=2.1, OR=1.5 (95% CI: 0.8-2.8)	0.326
Smoking	36 (36%)	χ^2=11.5, OR=3.2 (95% CI: 1.6-6.1)	0.002
Alcoholism	35 (35%)	χ^2=7.9, OR=2.7 (95% CI: 1.3-5.6)	0.039
Dyslipidemia	18 (18%)	χ^2=6.3, OR=2.1 (95% CI: 1.1-4.2)	0.045
Obesity	12 (12%)	χ^2=2.1, OR=1.6 (95% CI: 0.7-3.7)	0.146
Heart Disease/Atrial Fibrillation	15 (15%)	-	-
Past TIA or Stroke	10 (10%)	-	-
Family History of Stroke	2 (2%)	-	-

[Table 4] analyzes the association of modifiable and non-modifiable risk factors with AIS in the study cohort. Hypertension was the most prevalent risk factor, present in 64% of patients, with a significant association with stroke incidence (χ^2=14.8, OR=3.5; 95% CI: 1.9-6.3; p=0.001). Smoking and alcoholism were also significantly associated with AIS, reported in 36% (χ^2=11.5, OR=3.2; 95% CI: 1.6-6.1; p=0.002)

and 35% (χ^2=7.9, OR=2.7; 95% CI: 1.3-5.6; p=0.039) of patients respectively. Dyslipidemia was observed in 18%, also demonstrating statistical significance (χ^2=6.3, OR=2.1; 95% CI: 1.1-4.2; p=0.045). Diabetes mellitus and obesity were present in 26% and 12% of patients respectively but did not show a statistically significant association with stroke incidence in this study. Heart disease or atrial fibrillation, past transient ischemic attack (TIA) or stroke and family history of stroke were less frequent risk factors.

DISCUSSION

[Table 1] Clinical Profile and Presentation Patterns The mean age of 55.86 years in this study is consistent with other regional studies in India, such as the study by Jebasingh and Sivanesan (mean age 56 years), and the cardioembolic stroke cohort study from Hyderabad showing a mean age of 53.5 years. Male predominance at 76% aligns with reports from multiple Indian centers where males represent 59-77% of stroke patients. Abdu H et al,[5] (2022) Hemiplegia/hemiparesis being the predominant presentation (88%) concurs with classical stroke manifestations described by Begum and colleagues and regional clinical profiles where focal motor weakness is the most common symptom. Cranial nerve involvement and speech disturbances (67% and 44%, respectively) reflect the predominance of MCA territory infarcts as highlighted in previous studies, which commonly cause such deficits. Lower rates of seizures (7%) and cerebellar signs (3%) are similar to other observational cohorts. Khan AZ.(2024).[6]

[Table 2] Demographic and Clinical Characteristics The significant majority of patients being above 45 years (78%) supports the well-known age-related increase in stroke incidence found in Indian and international studies. The presence of stroke in younger groups (7% aged 18-30) echoes findings from Salerno A et al (2022),[7] who documented stroke even in young adults in South India. Socioeconomic gradients with 66% from low-income strata mirror findings in other Indian studies where poverty correlates with higher stroke risk due to risk factor burden and lifestyle. This socioeconomic distribution aligns with the literature highlighting disparities in stroke epidemiology across income groups in India. Montero-Cabezas JM et al (2022).[8]

[Table 3] Distribution of Vascular Territories The overwhelming involvement of the Middle Cerebral Artery (92%) in this study is consistent with multiple Indian and global studies that describe MCA territory infarcts as most common due to its large vascular territory and susceptibility to embolic/thrombotic occlusion. The relatively fewer cases in ACA and PCA territories are also comparable to prior epidemiological stroke data from tertiary centers in India. Gupta N et al (2020).[9]

[Table 4] Associations of Risk Factors Hypertension (64%) as the leading risk factor strongly parallels findings from various Indian studies reporting prevalence between 48.5% to 68%. The statistically significant odds ratio (3.5) supports hypertension as a major modifiable risk factor causing stroke. Smoking (36%) and alcoholism (35%) showed significant associations, congruent with previous studies showing tobacco and alcohol use as critical lifestyle contributors to stroke in India. Azevedo O et al (2020).[10] Dyslipidemia's moderate prevalence (18%) and association aligns with reports highlighting its emerging role in India's epidemiological transition. Diabetes mellitus, despite being present in 26%, lacked statistical significance in this cohort, a distinction that differs from other studies reporting significant associations. This discrepancy may relate to sample size or population characteristics. The low prevalence of family history (2%) and past transient ischemic attacks also echoes previous regional data. Rivera-Caravaca JM et al (2021).[11]

CONCLUSION

This hospital-based cross-sectional study of 100 acute ischemic stroke patients in South India highlights a predominance of middle-aged to elderly males presenting primarily with hemiplegia or hemiparesis. The middle cerebral artery was the most commonly affected vascular territory, consistent with typical stroke presentations. Hypertension emerged as the most significant modifiable risk factor, followed by smoking, alcoholism and dyslipidemia. These findings emphasize the high burden of modifiable cardiovascular risk factors in the studied population, underscoring the urgent need for targeted public health interventions aimed at early detection, control of hypertension, lifestyle modification and stroke awareness programs to mitigate stroke incidence and improve clinical outcomes in this region.

Limitations

This study is limited by its hospital-based, cross-sectional design, which may introduce selection bias as it only includes patients who sought hospital care, potentially excluding milder or fatal cases. The sample size of 100 patients, though sufficient for preliminary insights, limits the generalizability of findings to wider populations across diverse geographic regions. Data on some risk factors and clinical parameters were based on patient recall and medical records, which may result in information bias. Additionally, this study did not assess long-term outcomes or functional status post-stroke. Future prospective studies with larger, community-based samples and longitudinal follow-up are needed to validate these findings and assess stroke prognosis comprehensively.

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