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CLINICAL PROFILE AND OUTCOME BY 3-MONTH FOLLOW-UP IN YOUNG PATIENTS WITH STROKE

Internal Medicine

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ABSTRACT

Background: Stroke in young adults poses significant clinical and socio-economic challenges, with a distinct risk factor profile compared to older populations. Despite better neurological recovery potential, young stroke remains under-studied, especially in low-resource settings. **Objectives:** To assess the clinical profile, risk factors, and 3-month functional outcomes in young patients with stroke and to identify factors associated with poor prognosis. **Methods:** A prospective observational study was conducted over one year among 70 stroke patients aged 16–49 years at BRD Medical College, Gorakhpur. Clinical data, risk factors, stroke subtypes, and outcomes were recorded. Functional status was assessed at discharge and 3 months using the Modified Rankin Scale (mRS). **Results:** Haemorrhagic stroke was predominant (72.86%). Hypertension (64.29%) and metabolic syndrome were common risk factors. Ischaemic stroke patients showed significantly better functional recovery at 3 months ($p = 0.01$). **Conclusion:** Early identification of risk factors can improve outcomes in young stroke patients.

KEYWORDS

Stroke; Young adults; Haemorrhagic stroke; Modified Rankin Scale; Risk factors.

INTRODUCTION

Stroke, long considered a disease of the elderly, has increasingly emerged as a major health concern among young adults, posing a serious threat to their most productive years of life. The sudden onset of neurological deficits not only results in disability but also disrupts social and economic well-being, with significant consequences for families and society at large. Globally, stroke remains a leading cause of death and disability, with approximately 10%–14% of all strokes occurring in individuals under the age of 50 years [1,2]. In India, hospital-based studies have reported that young adults account for nearly 15%–30% of all stroke cases, highlighting a growing trend [3]. This epidemiological shift demands focused attention, as the risk factors and clinical patterns in young stroke patients differ significantly from those seen in older individuals. Unlike elderly patients, where atherosclerosis and age-related vascular changes predominate, stroke in the young is often linked to a broader spectrum of causes, including cardiac disorders, vasculitis, thrombophilias, and lifestyle-related factors such as smoking, substance abuse, and stress [4]. Despite this distinct clinical profile, young stroke remains under-recognized and under-studied, especially in low-resource settings. Although younger stroke survivors often demonstrate better neurological recovery due to greater neuroplasticity, they also face unique challenges such as recurrent strokes, cognitive impairment, and reduced employability, contributing to long-term socioeconomic burden [5]. Functional outcomes depend on early risk factor identification, timely management, and appropriate rehabilitation.

The purpose of the study was to assess the clinical profile, risk factors, and 3-month outcomes in young stroke patients to identify predictors of poor prognosis and guide early intervention and targeted rehabilitation.

MATERIALS AND METHODS

This prospective observational study was conducted over one year in the Department of Medicine, BRD Medical College, Gorakhpur. The study included inpatients diagnosed with stroke based on clinical presentation and radiological confirmation.

Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was taken from all participants. Patient confidentiality was ensured throughout the study. No conflicts of interest were declared.

Sample Size

The calculated sample size was 70, based on the formula:

$n = ((Z_1\text{-}\alpha/2 + Z_1\text{-}\beta)^2 \times p \times q) / d^2$,

where:

$Z_1\text{-}\alpha/2 = 1.96$ (for 5% significance), $Z_1\text{-}\beta = 0.84$ (for 80% power), $p = 0.48$ (prevalence), $q = 1 - p = 0.52$, $d = 0.17$.

Substituting these values, the final calculated sample size was approximately 70 patients.

Inclusion Criteria

- Patients aged between 16 and 49 years.
- Individuals diagnosed with stroke based on WHO criteria and confirmed by imaging.
- Patients admitted to BRD Medical College, Gorakhpur.
- Willingness to participate with written informed consent.

Exclusion Criteria

- Individuals aged above 49 years.
- Patients with clinical or radiological findings inconsistent with stroke.
- History of head injury.
- Diagnosed intracranial space-occupying lesions (ICSOL).
- Refusal to consent.

Study Procedure

All eligible patients were enrolled after obtaining informed consent. A detailed clinical history, including presenting symptoms and risk factors such as smoking, alcohol use, hypertension, diabetes, dyslipidemia, and prior cardiovascular disease, was recorded. A thorough neurological examination was performed to assess deficits. Stroke diagnosis was confirmed by a CT scan of the brain.

All participants underwent routine investigations, including complete blood count, random blood glucose, serum electrolytes, kidney and liver function tests, ECG, lipid profile, prothrombin time with INR, urine analysis, and chest X-ray. Echocardiography was performed in suspected cases of cardioembolic stroke.

Patients were followed during their hospital stay, and details regarding duration of hospitalization and outcomes at discharge were recorded. Disability levels were assessed at admission and discharge using the Modified Rankin Scale (MRS). Functional outcomes were further evaluated at a 3-month follow-up.

Statistical Analysis

Data were analyzed using SPSS. Continuous variables were expressed as mean ± SD. Group comparisons used t-test or Mann-Whitney U test. ROC analysis determined cut-offs. A p-value < 0.05 was considered significant.

RESULTS

The present study evaluated the valuable insight into the clinical profile and outcomes of young stroke patients.

Table 1: Demographic Profile, Stroke Subtypes, Risk Factors, and Lifestyle Characteristics of the Study Population

Category	Sub-Category	No. of Patients	Percentage
Age (Years)	20–30	11	15.71
	31–40	35	50.00
	41–50	24	34.29
	Mean ± SD	38.47 ± 6.88	
Gender	Female	42	60.00
	Male	28	40.00
Type of Stroke	CVT	2	2.86
	Haemorrhagic	51	72.86
	Ischaemic	17	24.2
Co-morbidity	Diabetes	17	24.29
	Dyslipidaemia	27	38.57
	Metabolic Syndrome	22	31.43
	Obese	26	37.14
	Hypertension	45	64.29
	RHD	6	8.57
Smoker	Present	14	20.00
	Absent	56	80.00
Alcoholic	Present	22	31.43
	Absent	48	68.57

Table 2: Mortality (MRS 6) Distribution Among Patients

Time	Total pt. expired (n=36)	Ischemic Stroke		Haemorrhagic Stroke		CVT	
		No.	Percentage	No.	Percentage	No.	Percentage
During Hospital Stay	21	6	28.57%	15	71.43%	0	0.00%
Within 3 months	15	1	6.6%	13	86.6%	1	6.6%

Table 3: Haematological Parameters, Liver Enzyme Levels, Serum Creatinine Across Stroke Types

Sub-Parameters	Parameter	CVT		Haemorrhagic		Ischaemic		P-Value
		Mean	SD	Mean	SD	Mean	SD	
Haematological Parameters	Hb	11.1	8	12.29	2.7	11.65	2.01	0.61
	TLC	17700	7700	13490.2	5139.31	12180	5109.06	0.32
	Platelets	200000	192000	183426	87577.2	181588.2	77599.98	0.96
Liver Enzyme Levels	AST	32.5	6.36	83.24	79.01	79.05	66.3	0.64
	ALT	28	5.65	70.25	64.04	73.56	68.64	0.60
Serum Creatinine Levels	Creatinine	0.77	0.23	1.49	1.32	0.94	0.31	0.18

Table 4: Modified Rankin Scale (MRS) Scores Across Stroke Types

MRS Score	CVT		Haemorrhagic		Ischaemic	
	Mean	SD	Mean	SD	Mean	SD
At discharge	5	1	4.96	0.89	4.94	1.14
At 3 months	4.5	2.12	4.41	1.94	3.41	2.26
P-Value	0.07		0.08		0.01	

Table 5: Comparison of Comorbidities Among Survivors and Non-Survivors

Factors	MRS at Discharge		MRS at 3 Months		P-Value
	Mean	SD	Mean	SD	
Diabetic	4.94	0.89	4.94	1.85	0.9
HTN	4.93	0.98	4.6	1.92	0.53
Metabolic Syndrome	4.95	1.04	4.72	1.98	0.67
Alcoholic	5.00	0.81	4.59	1.86	0.41
Obese	4.96	0.99	4.5	2.08	0.41
Pregnancy	5.00	0.00	2.5	0.70	<0.0001
CKD	5.5	0.57	5.25	1.50	0.52

Discussion

In our study, stroke predominantly affected young adults in their early middle age, with 50% of patients aged 31–40 years and a mean age of 38.47 ± 6.88 years. These findings are comparable to Chinni L et al. [6], who reported 62% of patients in the 36–45 age group. In contrast, Patne S V et al. [7] observed a higher age distribution with most patients above 60 years, reflecting demographic variability. A female predominance (60%) was seen in our study, aligning with Chinni L et al. [6], who reported a slight female majority. However, studies by Patne S V et al. [7] and Vaidya C V et al. [8] documented a male predominance, indicating possible regional or lifestyle influences. Haemorrhagic stroke was the most common subtype, accounting for 72.86% of cases, while ischaemic strokes were seen in 24.2% and CVT in 2.86%. These results contrast with Vaidya C V et al. [8] and Patne S V et al. [7], where ischaemic strokes were more frequent. Jadhav Y L et al. [9] described a broader distribution, including embolic, thrombotic, and haemorrhagic strokes, highlighting variability in stroke etiology across populations. Hypertension (64.29%) and dyslipidaemia (38.57%) emerged as the most common comorbidities, followed by obesity (37.14%) and metabolic syndrome (31.43%). Chinni L et al. [6] similarly reported high rates of dyslipidaemia (82.4%) and hypertension (35.3%), while Patne S V et al. [7] and Vaidya C V et al. [8] also identified hypertension as a major risk factor. Lifestyle factors such as smoking (20%) and alcohol use (31.43%) were also prevalent in our cohort. These findings align with Chinni L et al. [6], where substance use was seen in 47% of patients, and with Patne S V et al. [7] and Vaidya C V et al. [8], who highlighted smoking and alcohol as significant, modifiable risk factors for stroke. Mortality analysis revealed that most deaths occurred in haemorrhagic stroke patients during hospitalization (71.43%) and within three months (86.6%), consistent with Ghoreishi A et al. [10] and Yahya T et al. [11], who reported higher early mortality in haemorrhagic strokes. A strong association of hypertension, obesity, and metabolic syndrome with haemorrhagic stroke was evident, comparable to findings by Jadhav Y L et al. [9] and Ghoreishi A et al. [10] Functional outcomes at three months showed significant recovery in ischaemic stroke patients ($p = 0.01$), in line with Chinni L et al. [6], Ghoreishi A et al. [10], and Reddy B et al. [12] Pregnancy was the only comorbidity significantly associated with better recovery, as also observed by Reddy B et al.

Limitations of the Study: The limitations of the study include a relatively small sample size, single-centre design, and lack of long-term follow-up beyond three months, which may affect the generalizability of the findings.

Strengths of the Study: The strengths of the study include its prospective design, detailed clinical evaluation, and systematic 3-month follow-up using the Modified Rankin Scale, providing reliable data on stroke patterns and outcomes in young adults.

CONCLUSION

Haemorrhagic stroke was the predominant subtype in young adults, with hypertension and metabolic syndrome as major risk factors. Ischaemic stroke patients showed better recovery at three months, highlighting the need for early risk factor identification.

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