

# Assessment of Clinical Profiles, Risk Factors, and Management of Stroke

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**Abstract:** Globally, stroke is a leading cause of death and disability which is associated with several risk factors. Identifying these risk factors is essential for the effective prevention and management of stroke. The aim of this study was to assess the clinical parameters and risk factors associated with stroke and its management. The present prospective, retrospective, observational study was conducted in the neurology ward of Yashoda Hospitals, Hyderabad. Over a period of 6 months, 150 patients who met the study criteria were included. The required data was collected and analysed statistically using SPSS version 24. Out of the 150 patients (118 males, 32 females; mean age  $53.74 \pm 13.29$ ), 95 (63%) were diagnosed with ischemic stroke while 55 (37%) were diagnosed with hemorrhagic stroke. The majority of the patients had risk factors (75%). Among the observed clinical investigations, abnormalities were majorly observed in LDL, HbA1c and homocysteine. A significant association was found between stroke type and major risk factors ( $p < 0.05$ ). Ischemic stroke patients were primarily treated with statins and anti-platelets while anti-hypertensives were used for hemorrhagic stroke. A total of 53 patients (35.3%) underwent surgical interventions. The findings of this study highlight the predominance of ischemic stroke and the importance of early identification and management of modifiable risk factors.

**Keywords:** Cerebrovascular Accident, Risk factors, Hypertension, Clinical Profiles, Stroke Management.

## 1. Introduction

Stroke is recognised to be the second leading cause of death worldwide and a major cause of disability in adults [1]. According to WHO (World Health Organisation), stroke is defined as rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no evident cause other than of vascular origin [2].

Stroke is classified as ischemic or hemorrhagic. Ischemic stroke occurs due to obstruction of blood vessels, while hemorrhagic stroke results from blood vessel rupture. Ischemic stroke is the most common type (approximately 85%) whereas hemorrhagic stroke is relatively less common (approximately 15%) [3]. Ischemic stroke is considered to have better outcomes while hemorrhagic stroke poses a greater risk of mortality especially in acute and subacute phases [4][5].

Hypertension, diabetes mellitus, alcohol, smoking, diet, and physical inactivity are among some of the identified modifiable risk factors, whereas age, sex, family history, and ethnicity are non-modifiable risk factors of stroke [6]. The elderly and middle-aged are generally observed to be vulnerable to stroke, however recent studies indicate an increase in the risk of stroke in younger population. Hypertension, hypercholesterolemia, diabetes mellitus, smoking habits, sedentary lifestyle, diet, and obesity are the increasing modifiable risk factors in the younger generation [7]. Nevertheless, a significant number of

patients without any risk factors are also at risk of cerebrovascular disease [8].

Clinical profiles of ischemic stroke are commonly associated with lipid profile abnormalities and other cardio metabolic risk factors, reflecting the role of atherosclerosis and metabolic disturbances in the pathogenesis of ischemic events [9]. In contrast, hemorrhagic stroke is more frequently associated with chronic hypertension and structural vascular abnormalities that predispose to vessel rupture and intracranial bleeding.

This study aimed to assess the clinical profiles, risk factors of patients with hemorrhagic and ischemic stroke, and their therapeutic management. Furthermore, the study aimed to analyze the association between risk factors and various demographic parameters such as age, gender, and type of stroke.

## 2. Materials & Methods

It is a prospective, retrospective, observational study conducted in the Department of Neurology at Yashoda Hospitals, Hyderabad. Stroke patients older than 18 years of age, with or without co-morbidities, with first attack of stroke were included. Patients below 18 years of age, pregnant and lactating women, patients with Transient Ischemic Attack (TIA) and stroke due to trauma were excluded. A total of 150 patients who met the study criteria were included and the required data was collected using a specifically designed data collection form. The collected

data was analysed statistically using SPSS version 24. All continuous data are represented by the mean ± standard deviation or SD.

### 3. Results

In this study, the overall distribution of types of stroke showed that ischemic stroke was predominant, accounting for 95 (63%) cases, while hemorrhagic stroke accounted for 55 (37%) cases (Figure 1).

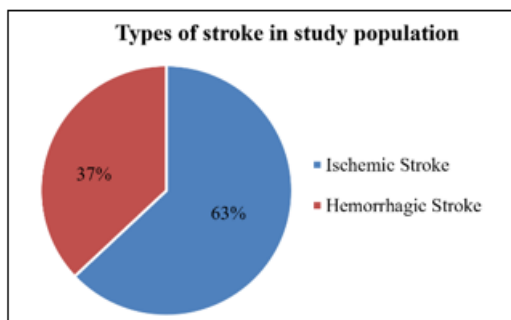


Figure 1: Distribution of study population based on type of stroke

The demographic characteristics of the study population showed that the majority of stroke patients belonged to 41-60- year age group. Among ischemic stroke patients, the majority was observed in the age group of 41-50 years (27.4%) followed by 51-60 years (26.3%). Similarly, hemorrhagic stroke was more frequent in 41-50 years (27.3%) and 61-70 years (27.3%) age group. Male patients constituted majority of the study population with 64.4% ischemic stroke cases and 35.6% hemorrhagic stroke cases, whereas females accounted for 59.3% ischemic and 40.7% hemorrhagic stroke cases, indicating a higher prevalence of stroke among males (Table 1).

Table 1: Baseline demographic characteristics of study population

Parameter	Ischemic Stroke N (%)	Hemorrhagic Stroke, N(%)
Age (years)	18-30	3 (3.2%)
	31-40	11 (11.6%)
	41-50	26 (27.4%)
	51-60	25 (26.3%)
	61-70	18 (18.9%)
	71-80	10(10.5%)
Gender	81-90	2(2.1%)
	Female	19 (59.3%)
Gender	Male	76 (64.4%)
	Female	42 (35.6%)
Gender	Male	42 (35.6%)
	Female	13 (40.7%)

The distribution of patients based on the presence of risk factors showed that majority of patients had risk factors (67.3%), whereas 49 (32.7%) patients had no risk factors (Figure 2).

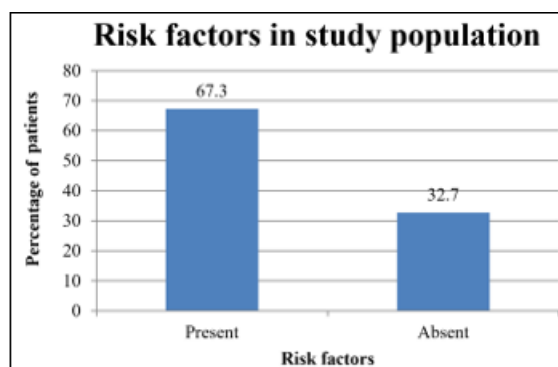


Figure 2: Distribution of population based on presence of risk factors

The distribution of risk factors among the study population indicated that hypertension and diabetes, either alone or in combination, were the most common risk factors. In ischemic stroke, hypertension (23.2%) and hypertension with diabetes (23.2%) were the most observed risk factors. In hemorrhagic stroke, hypertension with diabetes (32.7%) and obesity (50.9%) were predominant. Age-wise distribution showed that risk factors were more common in the age groups of 41-70 years. Gender-wise analysis of risk factors indicated a higher prevalence among males (Table 2). Chi-Square test for ischemic and hemorrhagic stroke was performed with risk factors: hypertension, diabetes and Coronary Artery Disease. The chi-square statistic is 6.7043. The p-value is 0.035. The result is significant at p < 0.05.

Table 2: Distribution of study population based on risk factors

Category	HTN	DM	CAD	HTN-DM	HTN- CAD	HTN-DM- CAD	Obesity
Stroke	Ischemic	23.20%	8.40%	3.20%	23.20%	1.10%	6.30%
	Hemorrhagic	23.60%	16.40%	0%	32.70%	1.80%	50.90%
Age	18-30	20%	0%	0%	0%	0%	60%
	31-40	31.60%	10.50%	5.30%	0%	0%	78.90%
	41-50	31.70%	12.20%	2.40%	9.80%	4.90%	46.30%
	51-60	16.20%	10.80%	2.70%	35.10%	0%	67.60%
	61-70	21.20%	9.10%	0%	48.50%	0%	66.70%
	71-80	18.20%	9.10%	0%	45.50%	0%	45.50%
Gender	81-90	0%	25%	0%	50%	0%	0%
	Male	23.70%	11%	0.80%	28%	1.70%	62.70%
Female	21.90%	12.50%	6.30%	21.90%	0%	0%	46.90%

Clinical laboratory parameters of stroke patients revealed several abnormalities. Abnormal GRBS levels were

observed in 28.92% and 11.90% of ischemic stroke and hemorrhagic stroke patients respectively, while elevated

HbA1c levels indicating diabetes were more frequent in ischemic stroke patients (66.67%). Hyponatremia was the most common abnormality in electrolyte profile, particularly among ischemic stroke patients. Elevated homocysteine levels were also observed in a considerable proportion of patients. Coagulation profile analysis showed abnormalities in PT and INR, suggesting coagulation disturbances. Lipid profile evaluation demonstrated elevated LDL and triglyceride levels, indicating dyslipidemia among stroke patients (Table 3).

**Table 3:** Distribution of clinical profiles of stroke patients

Parameter	Category	Ischemic n (%)	Hemorrhagic n (%)	Mean ± SD
<b>Glycemic Profile</b>				
GRBS (n=125)	Normal	59 (71.08%)	37 (88.10%)	145 ± 35.4
	Abnormal	24 (28.92%)	5 (11.90%)	
HbA1c (n=61)	Normal	10 (23.81%)	5 (29.41%)	6.2 ± 1.1
	Pre-diabetic	6 (14.29%)	4 (23.53%)	
	Diabetic	28 (66.67%)	8 (47.06%)	
<b>Electrolyte Profile</b>				
Sodium (n=142)	Hyponatremia	41 (47.13%)	19 (34.55%)	137 ± 4.6
	Normal	45 (51.72%)	32 (58.18%)	
	Hypertatremia	1 (1.15%)	4 (7.27%)	
<b>Homocysteine</b>				
Homocyst eine (n=40)	Normal	17 (48.57%)	1 (20%)	12.4 ± 3.2
	Abnormal	18 (51.43%)	4 (80%)	
<b>Coagulation Profile</b>				
PT (n=133)	Normal	66 (78.57%)	32 (65.31%)	14.3 ± 1.8
	Abnormal	18 (21.43%)	17 (34.69%)	
INR (n=133)	Normal	37 (44.05%)	23 (46.94%)	1.02 ± 0.15
	Abnormal	47 (55.95%)	26 (53.06%)	
<b>Lipid Profile</b>				
TC (n=56)	Normal	39 (78%)	2 (33.3%)	137.5 ± 34.7
	Abnormal	11 (22%)	4 (66.7%)	
HDL (n=56)	Normal	50 (100%)	4 (66.7%)	36.4 ± 8.9
	Abnormal	0 (0%)	2 (33.3%)	
LDL (n=56)	Normal	23 (46%)	2 (33.3%)	82.6 ± 32.4
	Abnormal	27 (54%)	4 (66.7%)	
VLDL (n=56)	Normal	36 (72%)	2 (33.3%)	19.3 ± 8.1
	Abnormal	14 (28%)	4 (66.7%)	
Triglycerides (n=56)	Normal	32 (64%)	3 (50%)	94.7 ± 35
	Abnormal	18 (36%)	3 (50%)	

Management of stroke patients included both surgical and pharmacotherapeutic interventions. Among surgical procedures, decompressive craniectomy (DECRA) was the most commonly performed procedure (28.30%), followed by thrombolysis and stenting. Pharmacological management differed between stroke types. In ischemic stroke patients, statins (93.7%) and antiplatelet agents (85.3%) were the most frequently prescribed medications, followed by anticoagulants and antihypertensives. In hemorrhagic stroke patients, anti-hypertensives (90.9%) and antiepileptics (80%) were commonly used. Supportive medications such as antibiotics, osmolar agents, neuroprotectives, and nutritional supplements were also frequently administered (Table 4).

**Table 4:** Management of stroke in study population

Management Type	Procedure / Drug Class	Number (%)	
Surgical (n=53)	Thrombolysis	11 (20.75%)	
	Thrombectomy	1 (1.89%)	
	Clipping/Coiling	6 (11.32%)	
	EVD	3 (5.66%)	
	Stenting	7 (13.21%)	
	DECRA	15 (28.30%)	
	Clipping + Evacuation + DECRA	1 (1.89%)	
	Clipping/Coiling + DECRA	3 (5.66%)	
	DECRA + EVD	1 (1.89%)	
	Thrombolysis + Thrombectomy	3 (5.66%)	
Pharmacotherapeutic (n=150)	Thrombolysis + Thrombectomy + DECRA	1 (1.89%)	
	Thrombolysis + DECRA	1 (1.89%)	
	Ischemic (n=95)	Antiplatelets	81 (85.3%)
		Anticoagulants	47 (49.5%)
		Statins	89 (93.7%)
		Steroids	6 (6.3%)
		Antihypertensives	47 (49.5%)
		Antidiabetics	14 (14.7%)
		Neuroprotectives	23 (24.2%)
		Antiepileptics	45 (47.4%)
		Antidepressants/ Antipsychotics	16 (16.8%)
		Respiratory meds	10 (10.5%)
	Hemorrhagic (n=55)	Osmolar agents	25 (26.3%)
		Antibiotics	43 (45.3%)
		Nutritional supplements	33 (34.7%)
Analgesics		11 (11.6%)	
Antihypertensives		50 (90.9%)	
Anticoagulants		13 (23.6%)	
Coagulants		5 (9.1%)	
Statins		7 (12.7%)	
Steroids		3 (5.5%)	
Antidiabetics		4 (7.3%)	
Hemorrhagic (n=55)	Neuroprotectives	12 (21.8%)	
	Antiepileptics	44 (80.0%)	
	Antidepressants/ Antipsychotics	8 (14.5%)	
	Respiratory meds	13 (23.6%)	
	Osmolar agents	14 (25.5%)	
	Antibiotics	36 (65.5%)	
	Nutritional supplements	15 (27.3%)	
	Analgesics	8 (14.5%)	

#### 4. Discussion

This is a prospective and retrospective observational study mainly focused on assessment of clinical profiles and prevalence of risk factors in stroke patients and their management.

Majority of the patients were diagnosed with ischemic stroke. Similar results were observed in the retrospective study by Sennay A et al which reported that incidence of ischemic stroke was greater than hemorrhagic stroke [10]. In our study, males showed a higher prevalence of both ischemic and hemorrhagic stroke. Similar male predominance in both types of stroke was demonstrated in a study conducted by Kumar M et al [8].

Most of the affected individuals in our study were seen in 41-50 year age group. This indicates that not only elderly but also middle aged populations with risk factors are susceptible to stroke. Similar results were reported by studies conducted by Abdu H et al and Syeda et al which revealed that incidence and prevalence of stroke was higher in people aged 45 years and above with the mean age being similar to our study [3][11].

A significant proportion of patients were identified with risk factors causing stroke. Among the patients having risk factors, hypertension was the most observed risk factor which was comparable to a study by Tun TZ et al [12]. In people with multiple risk factors, combination of hypertension and diabetes was the highest. When distribution of risk factors based on gender was performed, it was found that the prevalence of risk factors was more in males compared to females except in case of Coronary Artery Disease.

A statistically significant association between type of stroke and major risk factors was observed, emphasizing the importance of identification and modification of these risk factors in high-risk individuals to reduce the likelihood of incidence of stroke.

Evaluation of laboratory parameters revealed multiple abnormalities. Studies concluded that dyslipidaemia was observed in a significant proportion of participants with hypertriglyceridemia followed by hypercholesterolemia [11]. Similarly in our study, hypertriglyceridemia and hypercholesterolemia were found to be present upon evaluation of lipid profiles. In our study, despite having a considerable number of patients with diabetes, normoglycemic patients were found to be more. Evaluation of electrolyte profiles has shown no significant abnormalities. Homocysteine was considered as an independent risk factor in some stroke patients according to a study conducted by Pinzon et al [13]. Hyperhomocysteinemia was observed in a substantial proportion of patients in our study. Coagulopathy is one of the major risk factors for stroke [14]. PT & INR levels of many patients were evaluated, out of which abnormalities were found in both ischemic and hemorrhagic stroke patients.

Management of stroke includes surgical interventions and therapeutic management [15]. In this study, Ischemic stroke patients were primarily managed with antiplatelet agents and statins along with reperfusion strategies such as thrombolysis and endovascular interventions based on requirement. Hemorrhagic stroke patients were managed mainly by blood pressure control, seizure prevention and surgical interventions such as decompressive craniectomy. Supportive therapies included neuroprotective agents, osmolar agents commonly in both groups to manage complications and improve patient outcomes.

Early identification of risk factors in high-risk individuals and lifestyle modifications is useful in effective prevention of stroke. Our study signifies the growing incidence of stroke in not only elderly individuals but also middle aged population.

## 5. Conclusion

This study demonstrated that ischemic stroke was more prevalent than hemorrhagic stroke among hospitalized patients. Hypertension and diabetes emerged as the most important modifiable risk factors, while abnormalities in lipid and metabolic parameters were frequently observed. Comprehensive clinical assessment and timely therapeutic interventions are essential for optimizing patient outcomes. Early identification and control of modifiable risk factors may contribute substantially to reducing the burden of stroke and its associated complications.

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**Ethical Approval:** This study was approved by the Institutional Review Board of Anurag University bearing the research proposal number: IRB-AU/2024-2025/04.

## References

- [1] Kim AS, Cahill E, Cheng NT. Global Stroke Belt: Geographic Variation in Stroke Burden Worldwide. *Stroke*. 2015;46(12):3564-3570. doi:10.1161/STROKEAHA.115.008226
- [2] Coupland AP, Thapar A, Qureshi MI, Jenkins H, Davies AH. The definition of stroke. *J R Soc Med*. 2017;110(1):9-12. doi:10.1177/0141076816680121
- [3] Abdu H, Tadese F, Seyoum G. Comparison of Ischemic and Hemorrhagic Stroke in the Medical Ward of Dessie Referral Hospital, Northeast Ethiopia: A Retrospective Study. *Neurol Res Int*. 2021;2021:9996958. doi:10.1155/2021/9996958
- [4] Salvadori E, Papi G, Insalata G, et al. Comparison between Ischemic and Hemorrhagic Strokes in Functional Outcome at Discharge from an Intensive Rehabilitation Hospital. *Diagnostics (Basel)*. 2020;11(1):38. doi:10.3390/diagnostics11010038
- [5] Tadi P, Lui F. Acute Stroke. [Updated 2023 Aug 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing
- [6] Ayehu GW, Yitbarek GY, Zewdie EA, et al. Risk profile, clinical presentation, and determinants of stroke subtypes among patients with stroke admitted to public referral hospitals, Northwest Ethiopia in 2021: A cross-sectional study. *Front Neurol*. 2022;13:988677. doi:10.3389/fneur.2022.988677
- [7] Stevano R, Margono JT, Sutanto A. Clinical profile and risk factors of stroke: A Comparative analytical study between young and old onset. *Magna Neurologica*. 2023 Jan 1;1(1):13-6. doi:10.20961/magnaneurologica.v1i1.470
- [8] Kumar M, Kumar A, Saroj U, et al. A Study on the Clinical Profiles of Patients With Cerebrovascular Accident (Stroke) in a Tertiary Care Hospital in Jharkhand. *Cureus*. 2023;15(3):e35919. doi:10.7759/cureus.35919
- [9] Mufti TA, Iqbal HZ, Nawazish A, et al. Comparative Analysis of Clinical and Metabolic Profiles in Ischemic Versus Hemorrhagic Stroke Among Adults

- Presenting to a Tertiary Care Hospital. *Cureus*. 2025;17(8):e90245. doi:10.7759/cureus.90245
- [10] Gebremariam SA, Yang HS. Types, risk profiles, and outcomes of stroke patients in a tertiary teaching hospital in northern Ethiopia. *eNeurologicalSci*. 2016;3:41-47. doi:10.1016/j.ensci.2016.02.010
- [11] Batool SN, Qader AA, Mehmood K, Zareen SF, Khan HU, Shafique H. Lipid Profile in Stroke Patients Presenting in Emergency Department: Lipid Profile in Stroke Patients. *Journal of Health and Rehabilitation Research*. 2024;4(3):1-5. doi:10.61919/jhrr.v4i3.1624
- [12] Tun TZ, Han SM, Moji K, Matsui M. A descriptive study of stroke types, risk factors, clinical features, and outcomes in a tertiary hospital in Myanmar. *Trop Med Health*. 2024;52(1):26. doi:10.1186/s41182-024-00592-6
- [13] Pinzon RT, Wijaya VO, Veronica V. The role of homocysteine levels as a risk factor of ischemic stroke events: a systematic review and meta-analysis. *Front Neurol*. 2023;14:1144584. doi:10.3389/fneur.2023.1144584
- [14] Li YZ, Wang YH, Zhu JY, et al. Prognostic Value of an Integrated Coagulation Score in Ischemic Stroke After Endovascular Therapy: A retrospective case series. *Clin Appl Thromb Hemost*. 2026;32:10760296261418665. doi:10.1177/10760296261418665
- [15] Sič A, Tseriotis VS, Belanović B, Nemet M, Baralić M. Stroke Management in the Intensive Care Unit: Ischemic and Hemorrhagic Stroke Care. *NeuroSci*. 2025;6(4):121. doi:10.3390/neurosci6040121