MED-PHOENIX: JOURNAL OF NATIONAL MEDICAL COLLEGE

ORIGINAL ARTICLE

ASSESSMENT OF RISK FACTORS, CLINICAL PRESENTATIONS AND PREDICTORS OF STROKE ADMITTED IN A TERTIARY CARE CENTER OF MADHESH PROVINCE

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Date of Submission : May 3, 2025
Date of Acceptance : May 10, 2025
Date of Publication : August 6, 2025

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Citation:
Prasad SB, Ansari S, Patel S, Sah SK. Assessment of Risk Factors, Clinical Presentations and Predictors of Stroke Admitted in a Tertiary Care Center of Madhesh Province. Medphoenix. 2025;10(1):72-76.

DOI:https://doi.org/10.3126/medphoenix.v10i1.82641

Conflict of interest: None, ***Funding:*** None

Publisher: *National Medical College Pvt. Ltd.*
MedPhoenix - Journal of National Medical College (JNMC); 2025,10(1), available at www.jnmc.com.np

ISSN:2631-1992 (Online); ISSN:2392-425X (Print)

ABSTRACT

Introduction: *Stroke is the second-leading global cause of death behind heart disease and is a major cause of permanent disability. The risk factors for this condition are grouped as modifiable and non-modifiable factors. The study is designed with aim to assess risk factors, clinical presentations and predictors of stroke subtypes among adult patients visited the stroke unit.*

Materials and methods: *A hospital based cross sectional study conducted in National Medical College Teaching Hospital, Birgunj was conducted for 10 months (March 2023 to December 2023). A total of 100 subjects were enrolled after an ethical clearance taken from Institutional Review Committee and a proper consent taken from the concerned. Data was collected and entered in Microsoft Excel and analyzed using Statistical Package of Social Sciences (SPSS) version 20.*

Results: *A total of 100 subjects of diagnosed stroke enrolled in this study had a mean age of 50.52± 7.0 years. The major participants were male comprising of 66 % (n=66). As per the World Health Organization (WHO) criteria for diagnosis of stroke, 56% (n=56) of the participants had ischaemic stroke while 44% were diagnosed with the hemorrhagic stroke. Hypertension (94%, n=90) was the most common risk factor, followed by family history (n=35), alcohol use (n=25), smoking habit (n=24) and heart failure (n=17). The most common clinical presentation was headache (85%), aphasia (62%), and hemiparesis (55%) as per the complaints and findings of the participants.*

Conclusion: *The clinical features, risk factors and predictors of stroke in our study are similar to other low and middle resource countries. The findings of the study relates with the basic associations of the different factors with stroke and can be helpful predicting the diagnosis of stroke, enhancing the health education focused on reducing the stroke and launching large scale public health campaign for educating and raising awareness regarding the risk factors and its intervention.*

Keywords: *Clinical Presentation, Predictors, Risk Factors, Stroke*

INTRODUCTION

Stroke is an acute clinical event of focal or global neurological disturbance that results in impairment of cerebral circulation. Due to the lack of blood supply oxygen and unable to remove waste products, the cells of brain dies brain cells quickly begin to die.[1,2,3] A report in 2013 states that stroke is the second-leading global cause of death behind heart disease is a major cause of permanent disability[4,5] and this trend in present day is also increasing as the number of stroke cases in terms of its mortality, morbidity and resultant disability is increasing across the globe.[6] The Global Burden of Diseases, Injuries and Risk Factors Study (GBD) in 2010 postulated that stroke is the leading cardiovascular disease (CVD) which causes mortality and disability in sub-Saharan Africa and other low and middle income countries.[7]

The probable risk factors for CVA can be classified as modifiable and non-modifiable groups. Age, gender, race and ethnicity, family history comes under non-modifiable risk factors: whereas condition of hypertension, alcohol and tobacco intake including smoking, dietary factors, and life style pattern including the physical inactivity are grouped under modifiable risk factors. These different factors can play in the development of stroke in the

population.[8,9] Similarly, the poor socio-economic status can increase the probability of development of stroke and can lead to more advent disability due to their inability to afford the high cost of stroke management.[10] Though we have the ample number of cases in our locality, the stroke specific risk factors and its association is less available in our setting. Among the modifiable risk factors that are significant for stroke, hypertension is still the most common risk factor worldwide.[11]

There is a poor pooled data on prevalence, risks factors and outcome of stroke. This becomes the reason for the formulation of well-adjusted and formulated response and management of stroke.

This study will generate evidences for improving the prevention strategy of stroke and guide health authorities to halt or reduce the devastating effects of stoke at different sectors of our community by having overview knowledge of clinical characteristics of stroke. Hence, this study will help to assess risk factors, clinical presentation and predictors of stroke subtypes among adult patients admitted in our clinical setting.

MATERIALS AND METHODS

This hospital based observational study conducted in National Medical College Teaching Hospital for a duration of 10 months (March 2023 to December 2023), enrolled 100 participants diagnosed with stroke visiting the Neurosurgery and Neuromedicine unit. Ethical clearance was taken from Institutional Review Committee (IRC) of National Medical College Teaching Hospital (Ref. F-NMC/621/079-080). Written formal consent in understandable language was obtained from the participants/attendants.

Inclusion criteria: Patients admitted in ICU and IPDs with the diagnosis of stroke.

All adult patients (> 18 years) diagnosed stroke clinically or by brain imaging and admitted.

Nepali Citizen

Age more than 18 years

Exclusion criteria: The following exclusion criteria will be applicable:

Pregnancy

Cases of Hematoma Cranium

Previous known case of stroke

Clinical evaluation: The stroke patients were clinically evaluated by principle investigator and co-investigators who is also the attending clinician and post graduation residents of the Neurosurgery and medicine unit of National Medical College Teaching Hospital.

Statistical Analysis

Data were collected, entered using Microsoft Excel and analyzed using Statistical Package of Social Sciences (SPSS) version 20. Descriptive statistics was used to express demographic data. Bivariate analysis between groups was done using Chi-square for categorical data. ANOVA and Kruskal-wallis were used for multiple group analysis. For parametric variables, independent t-test for continuous data and Pearson correlation coefficient were used to assess the relation between quantitative variables. For non-parametric variables, Mann Whitney U test and Spearman correlation were used. Level of significance of 5%, i.e., 95% confidence interval was considered. Statistical significance was considered at $p \leq 0.05$.

RESULTS

A total of 100 patients diagnosed with stroke were enrolled in this study was carried out for a duration of 10 months at National Medical College Teaching Hospital. As per the guidelines of WHO, 56% of the participants had ischemic stroke (IS) and remaining 44% had hemorrhagic stroke (HS). A total of 62 patients were evaluated along with CT scan of the brain and the remaining were evaluated based on clinical presentation.The mean age of the participants was 50.52 ± 7.0 years.

The major participants were male comprising of 66 % (n=66). Hypertension (94%, n=94) was the most common risk factor, followed by family history (n=35), alcohol use (n=25), smoking habit (n=24) and heart failure (n=17). The most common clinical presentation was headache (85%), aphasia (62%), and hemiparesis (55%) as per the complaints and findings of the participants.

The mean age of the participants was 50.52 ± 7.0 years with highest number of patients from 45-65 years (n=66). The male: female ratio was found to be 65:35 (1.9:1). Majority of the participants had a normal BMI (75%) and 10% of the participants were overweight. 86% of the participants were on the mixed diet before the attack of stroke.

Table 1: Patient characteristics of patients admitted in stroke unit

Patients Characteristics		Total Participants (n=100)	Ischemic Stroke (n=56)	Hemorrhagic stroke (n=44)
Age (years)	<45	18 (18%)	10 (17.9%)	8 (18.2%)
	45-65	66 (66%)	36 (64.3%)	30 (68.2%)
	>65	16 (16%)	10 (17.9%)	6 (13.6%)
Gender	Male	65 (65%)	37 (66.1%)	28 (63.6%)
	Female	35 (35%)	19 (33.9%)	16 (36.4%)
Residence	Rural	70 (70%)	40 (71.4%)	30 (68.2%)
	Urban	30 (30%)	16 (28.6%)	14 (31.8%)
Marital Status	Married	86 (86%)	47 (83.9%)	39 (88.6%)
	Divorced	5 (5%)	3 (5.4%)	2 (4.6%)
	Widow	9 (9%)	6 (10.7%)	3 (6.8%)
Religion	Hindu	68 (68%)	42 (75.0%)	26 (59.1%)
	Muslim	32 (32%)	14 (25.0%)	18 (40.9%)
Dietary Habit	Mixed Diet	86 (86%)	46 (82.1%)	40 (90.9%)
	Vegetarian	14 (14%)	10 (17.9%)	4 (9.1%)
Body Mass Index (BMI) (kg/m^2)	<18.5 (underweight)	15 (15%)	10 (17.9%)	5 (11.4%)
	18.6-24.9 (normal)	75 (75%)	40 (71.4%)	35 (79.5%)
	25.0-29.9 (overweight)	10 (10%)	6 (10.7%)	4 (9.1%)

Risk factors for different types of stroke

The risk factors were analyzed in the stroke patients enrolled in this study. Hypertension was the most common factor seen in 94 participants followed by family history (n=35). Alcohol intake as a risk factor was found in 25% of the participants followed by smoking habit as shown in the table 2.

Table 2: Risk factors of the stroke subtypes among the participants

Stroke Risk Factors		Total Patient	Ischemic Stroke	Hemorrhagic Stroke	OR (P value)
Hypertension (HTN)	New Diagnosis	20 (21.3%)	8 (17.4%)	12 (25.0%)	1.011
	Known HTN	74 (78.7%)	38 (82.6%)	36 (75.0%)	0.356
Family History (n=35)	HTN	18 (51.14%)	11 (31.4)	7 (17.9%)	0.519
	Diabetes Mellitus	14 (40%)	9 (25.7%)	5 (14.3%)	0.528
	Ischemic Heart Disease	9 (25.7%)	4 (11.4%)	5 (14.3%)	0.586
	Stroke	5 (14.3%)	4 911.4%)	1(2.9%)	0.899
	Sudden Death	2 (5.7%)	1 (2.9%)	1 (2.9%)	0.789
Alcohol Intake	Former Drinker	20 (80%)	9 (45%)	11(55%)	0.980
	Current Use	5 (20%)	1 (20%)	4 (80%)	0.982
Smoking Habit	Current Smoker	12 (50%)	2 (16.7%)	10 83.3%)	0.082
	Past Smoker	12 (50%)	6 (50%)	6 (50%)	1.000
Heart Failure		17 (17%)	13 (23.2%)	4 (9.1%)	0.008
Atrial Fibrillation		16 (16%)	12 (21.4%)	4 (9.1%)	0.019
Coronary Disease (CHD, IHD)		12 (12%)	10 (17.9%)	2 (4.5%)	0.051
Hypertensive Heart Disease		12 (12%)	9 (16.1%)	3 (6.8%)	0.064
Headache or Migraine		10 (10%)	3 (5.4%)	7 (15.9%)	0.031
Head Injury		8 (8%)	2 (3.6%)	6 (13.6%)	0.078
Diabetes Mellitus		10 (10%)	5 (8.9%)	5 (11.4%)	0.548

*CHD: Coronary Heart Disease, IHD: Ischemic Heart Disease

Diabetes mellitus was found to be the co-morbid condition in 10 patients with 5 each in stroke subtypes but there was no statistically significant difference between stroke subtypes (p = 0.548)

Alcohol consumption and smoking habits were less prevalent in the ischemic stroke group compared to the hemorrhagic groups as shown in the table 2.

Clinical presentation of stroke patient

The most common complaint and presentation was headache among 85% of the stroke patients, followed by aphasia (62%), hemiparesis (55%), facial palsy (53%) and others as shown in the table 3. The commonest clinical presentation in hemorrhagic stroke type was headache (97.8%), followed by aphasia (68.2%) and vomiting (63.6%).

Table 3: Clinical presentations in the stroke subtypes

Clinical Presentations	Total Participants (n=100)	Ischemic Stroke (n=56)	Hemorrhagic Stroke (n=44)	OR (P value)
Headache	85 (85%)	40 (71.4%)	45 (97.8%)	0.192
Aphasia/ Dysphasia	62 (62%)	32 (57.1%)	30 (68.2%)	0.637
Hemiparesis	55 (55%)	23 (41.1%)	22 (50%)	0.601
Facial Palsy	53 (53%)	30 (53.4%)	23 (52.3%)	0.124
Vomiting	46 (46%)	18 (32.1%)	28 (63.6%)	0.021
Urinary Incontinence	38 (38%)	18 (32.1%)	20 (45.5%)	0.402
Decreased Consciousness	37 (37%)	18 (32.1%)	19 (43.2%)	0.563
Hemiplegia	34 (34%)	17 (30.4%)	17 (38.6%)	0.501
Dysphagia	24 (24%)	11 (19.6%)	13 (29.5%)	0.821
Slurred Speech	20 (20%)	9 (16.1%)	11 (25%)	0.189
Blurred Vision	20 (20%)	8 (14.3%)	12 (27.3%)	0.129
Loss of Memory	16 (16%)	9 (16.1%)	7 (15.9%)	0.724
Asphyxia	12 (12%)	5 (8.9%)	7 (15.9%)	0.484
Chest pain	12 (12%)	8 (14.3%)	4 (9.1%)	0.019
Coma	10 (10%)	2 (3.6%)	8 (18.2%)	0.031
Convulsion, Abnormal movement	7 (7%)	5 (8.9%)	2 (4.5%)	0.402
Monoparesis	3 (3%)	0 (0%)	3 (6.8%)	0.864

Hemorrhagic stroke patients presented more with come (p=0.031) and vomiting (p=0.021), whereas ischemic stroke participants were more likely presenting with chest pain (p=0.091).

DISCUSSION

In this hospital based study carried out at National Medical College Teaching Hospital, Birgunj, a total of 100 patients diagnosed with stroke were enrolled and carried out for a duration of 10 months. As per the guidelines of WHO, 56% of the participants had ischemic stroke (IS) and remaining 44% had hemorrhagic stroke (HS). A total of 62 patients were evaluated along with CT scan of the brain and the remaining were evaluated based on clinical presentation. The mean age of the participants was 50.52 ± 7.0 years. The major participants were male comprising of 66 % (n=66). Hypertension (94%, n=94) was the most common risk factor, followed by family history (n=35), alcohol use (n=25), smoking habit (n=24) and heart failure (n=17). The most common clinical presentation was headache (85%), aphasia (62%), and hemiparesis (55%) as per the complaints and findings of the participants. The mean age of the participants was 50.52 ± 7.0 years with highest number of patients from 45-65 years (n=66). The male: female ratio was found to be 65:35 (1.9:1). Majority of the participants had a normal BMI (75%) and 10% of the participants were overweight. 86% of the participants were on the mixed diet before the attack of stroke.

The mean age of the participants was 50.52 ± 7.0 years that is seen in the several studies including a study in Ethiopia in 2015.[12] The higher number of stroke patients is male compared to female that have been illustrated in other studies as well. A study done in Cameroon in 2015 supports this finding.[13]

The commonest risk factor for stroke was hypertension that is in line with the findings of most of the studies. Uncontrolled hypertension is the common risk factor for stroke in both developing and developing countries.[14,15]

The most common clinical presentation was headache (85%) followed by aphasia (62%) and hemiparesis. This type of similar results were found in the study done by Walker et al.[16] however, different finding was there which showed motor symptoms such as hemiplegia as the commonest presentation.[17]

There is a poor pooled data on prevalence, risks factors and outcome of stroke. This becomes the reason for the formulation of well-adjusted and formulated response and management of stroke.

This study will generate evidences for improving the prevention strategy of stroke and guide health authorities to halt or reduce the devastating effects of stoke at different sectors of our community by having overview knowledge of clinical characteristics of stroke. Hence, this study will help to assess risk factors, clinical presentation and predictors of stroke subtypes among adult patients admitted in our clinical setting.

CONCLUSION

The most common risk factor pointed out was hypertension and the level of uncontrolled blood pressure in hypertensive patients we observed in this study. The most common clinical presentation was headache and motor symptoms (hemiplegia/hemiparesis). Hemorrhagic stroke patients were more likely to have coma and vomiting but ischemic stroke patients more likely presented with chest pain. The clinical features, risk factors and predictors of stroke in our study are similar to other low and middle resource countries. The findings of the study relates with the basic associations of the different factors with stroke and can be helpful predicting the diagnosis of stroke, enhancing the health education focused on reducing the stroke and launching large scale public health campaign for educating and raising awareness regarding the risk factors and its intervention.

ACKNOWLEDGEMENT

We would like to express our heartfelt thanks to all the participants of this study and the health professionals

and post graduate students of National Medical College, Birgunj, who helped directly and indirectly in carrying out this study.

CONFLICT OF INTEREST: Not any

REFERENCES

1. Investigators WMPP. The world health organization monica project (monitoring trends and determinants in cardiovascular disease): a major international collaboration. J ClinEpidemiol. 1988;41(2):105–14.

2. National Collaborating Centre for Chronic Conditions (UK). Stroke: National Clinical Guideline for Diagnosis and Initial Management of Acute Stroke and Transient Ischaemic Attack (TIA). London: Royal College of Physicians (UK); 2008. (NICE Clinical Guidelines, No. 68 (1), Introduction. Available from: https://www.ncbi.nlm.nih.gov/books/NBK53302/

3. Jowi JO, Mativo PM. Pathological sub-types, risk factors and outcome of stroke at the Nairobi hospital, Kenya. East Afr Med J. 2008;85(12):572–81.

4. Feigin VL, Forouzanfar MH, Krishnamurthi R, Mensah GA, Connor M, Bennett DA, Moran AE, Sacco RL, Anderson L, Truelsen T, et al. Global and regional burden of stroke during 1990-2010: findings from the global burden of disease study 2010. Lancet (London, England). 2014;383(9913):245–54.

5. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, Das SR, de Ferranti S, Despres JP, Fullerton HJ, et al. Heart disease and stroke Statistics-2016 update: a report from the American Heart Association. Circulation. 2016;133(4):e38–360.

6. Feigin VL, Norrving B, Mensah GA. Global burden of stroke. Circ Res. 2017; 120(3):439–48.

7. Moran A, Forouzanfar M, Sampson U, Chugh S, Feigin V, Mensah G. The epidemiology of cardiovascular diseases in sub-Saharan Africa: the global burden of diseases, injuries and risk factors 2010 study. ProgCardiovasc Dis. 2013;56(3):234–9.

8. Boehme AK, Esenwa C, Elkind MSV. Stroke risk factors, genetics, and prevention. Circ Res. 2017;120(3):472–95.

9. Zewdie A, Debebe F, Kebede S, Azazh A, Laytin A, Pashmforoosh G, Hassen GW. Prospective assessment of patients with stroke in TikurAnbessaspecialised hospital, Addis Ababa, Ethiopia. African J Emerg Med. 2018;8(1):21–4.

10. Patne SV, Chintale KN. Study of clinical profile of stroke patients in rural tertiary health care Centre. Int J Adv Med. 2016;3(3):666–70.

11. Abate AT, Bayu N, Mariam TG. Hypertensive Patients' Knowledge of Risk Factors and Warning Signs of Stroke at FelegeHiwot Referral Hospital, Northwest Ethiopia: A Cross-Sectional Study. Neurol Res Int. 2019;2019:7.

12. Deresse B, Shaweno D. Epidemiology and in-hospital outcome of stroke in South Ethiopia. J Neurol Sci. 2015;355(1–2):138–142. doi: 10.1016/j.jns.2015.06.001.

13. Nkoke C, Lekoubou A, Balti E, Kengne AP. Stroke mortality and its determinants in a resource-limited setting: a prospective cohort study in Yaounde, Cameroon. J Neurol Sci. 2015;358(1–2):113–117. doi: 10.1016/j.jns.2015.08.033.

14. Watila MM, Nyandaiti YW, Ibrahim A, Balarabe SA, Gezawa I, Bakki B, Tahir A, Sulaiman MM, Bwala SA. Risk factor profile among black stroke patients in northeastern Nigeria. Neurosci Biobehav Rev. 2012;4(5):50–58.

15. Bekele A, Kebede O. Stroke admission to Tikur Anbessa teaching hospital: with emphasis on stroke in the young. Ethiop J Health Dev. 2002;16(3):309–315.

16. Walker RW, Rolfe M, Kelly PJ, George MO, James OF. Mortality and recovery after stroke in the Gambia. Stroke. 2003;34(7):1604–1609. doi: 10.1161/01.STR.0000077943.63718.67.

17. Vaidya CV, Majmudar DK. A retrospective study of clinical profile of stroke patients from GMERS medical college and hospital, Gandhinagar, Gujarat. Int J Clin Trials. 2014;1(2):62–66. doi: 10.5455/2349-3259.ijct20140805.