International Journal of Research in Medical Sciences
Haque A et al. Int J Res Med Sci. 2026 May;14(5):1832-1836
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20261316

Original Research Article

Demographic characteristics and risk factor profile of acute stroke patients

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Received: 04 March 2026
Accepted: 14 April 2026

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ABSTRACT

Background: Stroke is a major contributor to mortality and long-term disability worldwide, with a growing burden in low- and middle-income countries. Inadequate control of modifiable cardiovascular risk factors plays a central role in the rising incidence of stroke in these regions. Understanding the demographic profile and risk factor distribution among stroke patients is essential for effective prevention strategies. Hospital-based data provide valuable insight into existing gaps in risk detection and management. This study aimed to describe the demographic characteristics and risk factor profile of patients presenting with acute stroke in a tertiary care hospital.
Methods: This cross-sectional observational study included 100 patients with acute stroke admitted to a tertiary care hospital in Bangladesh. Demographic variables, residence and major cardiovascular risk factors were documented using structured data collection tools. Data were analyzed using SPSS version 22.
Results: Most patients were aged 51-60 years (47%), with a male predominance (71%). Urban residents comprised 61% of cases. Hypertension was the most common risk factor (65%), followed by smoking (49%) and heart disease (29%). Among hypertensive patients, only 21.6% were regularly treated, while 33.8% were newly diagnosed at admission. Diabetes mellitus was present in 18% of patients, with 38.9% newly diagnosed. Coexisting hypertension and diabetes were observed in 13% of patients.
Conclusions: Acute stroke patients exhibited a high prevalence of modifiable and inadequately controlled cardiovascular risk factors. Strengthening early detection and management of these risk factors is essential to reducing stroke burden.

Keywords: Acute stroke, Diabetes mellitus, Epidemiology, Hypertension, Risk factors

INTRODUCTION

Stroke is a leading global public health challenge and ranks among the foremost causes of death and long-term disability in adults. Recently, the global burden has increasingly shifted towards low- and middle-income countries (LMICs), where nearly 70% of stroke-related deaths now occur. This unequal distribution is largely driven by rapid urbanization, epidemiological transitions, insufficient control of cardiovascular risk factors and restricted access to preventive healthcare services.[1,2] In South Asia, including Bangladesh, stroke tends to affect younger populations compared to high-income nations, amplifying the socioeconomic impact in these regions.[3]

Demographic factors such as age, sex and place of residence significantly influence stroke risk and outcomes. For instance, older age remains the most powerful non-modifiable risk factor, while sex differences have been observed in stroke prevalence and complications.[4,5] Urban–rural disparities in stroke epidemiology further reveal that urban populations often exhibit a higher prevalence of hypertension, diabetes and sedentary lifestyles, whereas rural populations face delays in diagnosis and limited healthcare access, adversely affecting outcomes.[2,6]

Among modifiable risk factors, hypertension emerges as the most critical, consistently accounting for over half of stroke cases globally, both ischemic and hemorrhagic.[1,2] However, poor detection, inadequate treatment and suboptimal adherence to antihypertensive therapies remain pervasive challenges, especially in LMICs.[3] Diabetes mellitus is another key risk factor that exacerbates stroke risk by accelerating atherosclerosis and microvascular disease. It has been linked to increased stroke incidence and complications such as small vessel disease.[4,5] Cigarette smoking contributes through mechanisms that induce endothelial dysfunction and prothrombotic states, further elevating stroke susceptibility.[4] Cardiac disorders, including ischemic heart disease, valvular abnormalities and atrial fibrillation, significantly heighten the risk of embolic strokes and negatively influence clinical outcomes.[7]

The interplay of demographic and clinical risk factors with stroke pathogenesis underscores the importance of population-specific data. In Bangladesh, despite a high stroke burden, there is a paucity of comprehensive hospital-based data focusing on the demographic profile and modifiable risk factors in acute stroke patients. Existing studies mainly highlight clinical presentation or imaging features rather than preventive aspects or treatment gaps.[3] Characterizing risk factors, including previously undetected conditions at admission and treatment status, could illuminate critical deficits in primary and secondary prevention, guiding tailored interventions.

This study was designed to detail the demographic characteristics and cardiovascular risk factors including hypertension, diabetes mellitus, smoking and heart disease- among acute stroke patients admitted to a tertiary care hospital in Bangladesh. By systematically analyzing variables such as age, sex and residence alongside these risk profiles, it aims to generate context-specific evidence to inform targeted stroke prevention and control strategies appropriate for this LMIC setting. Such data are pivotal for optimizing allocation of healthcare resources and implementing effective public health policies to mitigate the growing stroke burden in Bangladesh.

METHODS

This hospital-based cross-sectional observational study was conducted in the department of medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, over one year. A total of 100 patients of both sexes presenting with acute stroke were enrolled purposively according to predefined inclusion and exclusion criteria. Adult patients admitted with a sudden onset of focal neurological deficits suggestive of acute stroke and subsequently confirmed by neuroimaging were included. Patients with a history of previous stroke, head injury, intracranial space-occupying lesions, bleeding disorders, or those unwilling to provide consent were excluded. Data were collected using a structured and pretested questionnaire through direct patient interview or, when necessary, from reliable attendants. Information regarding demographic variables, residence and known risk factors such as hypertension, diabetes mellitus, smoking, cardiac diseases, hyperlipidaemia and history of transient ischemic attack was recorded. Blood pressure was measured using standard sphygmomanometry and relevant laboratory investigations were reviewed to confirm metabolic risk factors. The treatment status of hypertension and diabetes mellitus was carefully documented, distinguishing between regularly treated, irregularly treated and newly diagnosed cases at admission. All collected data were cross-checked with hospital records to ensure accuracy and consistency. Ethical approval was obtained from the institutional ethical review committee and informed consent was secured from all participants or their legal guardians. Confidentiality of patient information was strictly maintained. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics were expressed as frequencies and percentages. Associations between categorical variables were assessed using appropriate statistical tests and a p value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows the demographic characteristics of the study patients. The maximum number of patients 47.0% in the age group 51-60 years, followed by 23.0% between ages 60-70 years. Mean age 53.2±12.4 years. Among the participants, 71.0% patients were male and 29.0% patients

were female, with male-female ratio of 2.44:1. The majority, 61.0% of the respondents, came from urban areas and 39.0% from rural areas.

Table 1: Demographic characteristics of the patients (n=100).

Characteristics		Frequency	Percentage
Age group (years)	21-30	2	2.0
	31-40	6	6.0
	41-50	12	12.0
	51-60	47	47.0
	61-70	23	23.0
	>70	10	10.0
Sex	Male	71	71.0
	Female	29	29.0
Residence	Urban	61	61.0
	Rural	39	39.0

Table 2: Risk factors for stroke among the study population (n=100).

Risk factor	Number of patients	Percentage
Hypertension	65	65.0
Smoking	49	49.0
Heart disease	29	29.0
Diabetes mellitus	15	15.0
Hyperlipidaemia	7	7.0
Oral contraceptive use	6	6.0
Past history of TIA	12	12.0
Alcohol intake	1	1.0
Collagen disease	1	1.0
Polycythaemia	0	0.0

In this present study, hypertension (65%) is found to be the most common risk factor. The next important risk factor is smoking (49%), followed by heart disease (29%) and diabetes mellitus (15%).

Table 3: Hypertension prevalence and treatment status (n=65).

Hypertension status	Number of patients	Percentage
Regularly treated	14	21.6
Irregularly/not treated	29	44.6
Newly diagnosed	22	33.8

Table 3 shows that among the hypertensive patients, only 21.6% were regularly treated, 44.6% were on irregularly/no treatment. A good number of patients 33.8% was diagnosed as hypertensive patients for the first time after admission to the hospital.

Table 4 shows that out of 31 patients, 48.38% of the patients were suffering from ischaemic heart diseases, 22.58% patients were suffering from valvular heart diseases.

Table 4: Frequency of different heart diseases (n=31).

Heart disease	Number of patients	Percentage
Ischemic heart disease	15	48.4
Valvular heart disease	7	22.6
Myocardial infarction	6	19.4
Non-valvular atrial fibrillation	3	9.7

Table 5: Diabetes mellitus prevalence and treatment status (n=18).

Diabetes status	Number of patients	Percentage
Previously diagnosed	11	61.1
Regularly treated	6	33.3
Irregularly/not treated	3	16.7
Newly diagnosed	7	38.9

Table 5 shows that out of 18 diabetic patients, 61.1% was previously diagnosed while 38.9% was newly diagnosed as diabetic patient Among the previously diagnosed patients, 33.3% were regularly treated, 16.7% were irregular/no treatment.

Table 6: Coexistence of hypertension and diabetes mellitus (n=100).

Condition	Number of patients	Percentage
Hypertension	66	66.0
Diabetes mellitus	18	18.0
Both hypertension and diabetes	13	13.0

Table 6 shows 13% of the studied patients were suffering from both hypertension and diabetes mellitus.

DISCUSSION

This study offers a detailed analysis of demographic and cardiovascular risk factor profiles among acute stroke patients in a tertiary care hospital in Bangladesh, revealing several pertinent findings relevant to stroke epidemiology in resource-constrained contexts. The predominance of stroke among relatively younger patients- particularly those aged 51 to 60 years- aligns with regional data indicating earlier stroke onset in South Asian populations compared to high-income countries, attributable to earlier and prolonged exposure to vascular risks alongside limited preventive healthcare access.[8] The male preponderance parallels prior observations wherein social, behavioral and occupational influences may elevate stroke risk in men within this geographic setting.[9]

Urban residency was more common among stroke patients in this cohort, consistent with global trends linking urbanization to heightened stroke risk factors such as sedentary lifestyle, dietary shifts, hypertension and diabetes mellitus.[10] However, urban predominance may also reflect differential access to tertiary care, potentially leading to underestimation of stroke burden in rural populations.[11] The rising stroke incidence in urban areas underscores the need for targeted urban public health interventions focusing on modifiable lifestyle factors.

Hypertension emerged as the most prevalent modifiable risk factor, affecting approximately two-thirds of patients, congruent with worldwide evidence that positions hypertension as the paramount risk factor for both ischemic and hemorrhagic strokes.[8,9] The alarming observation that many hypertensive patients were newly diagnosed or irregularly treated on hospitalization reveals systemic inadequacies in primary care infrastructure and patient adherence, corroborated by reports from other low- and middle-income countries.[12] This gap in hypertension awareness and control contributes substantially to stroke incidence and severity, necessitating enhanced screening and continuity of care.

Smoking was the second most common risk factor, present in nearly half the cohort. Tobacco use is a well-established independent risk factor for stroke via pathways including endothelial dysfunction, heightened platelet activity and accelerated atherosclerotic plaque formation.[8] The high smoking prevalence in this population highlights the critical need for integrating comprehensive tobacco cessation programs and legislations within national stroke prevention strategies.

The presence of diabetes mellitus in 18 percent of patients, many newly diagnosed during admission, alongside the 13 percent of patients with comorbid diabetes and hypertension, magnifies the cerebrovascular risk, given the synergistic effects of these conditions on arterial pathology.[12] Poor glycemic control and inadequate treatment among known diabetics reflect challenges in chronic disease management at the community level, emphasizing the importance of integrated care models that incorporate patient education and metabolic control to reduce stroke risk.[8,12]

Cardiac diseases accounted for nearly a third of the cases, with ischemic heart disease most commonly identified. This association between coronary artery disease and stroke aligns with literature illustrating shared risk factors and the role of embolic mechanisms in stroke pathophysiology. Though less frequent, valvular heart disease and atrial fibrillation remain clinically important contributors to cardioembolic stroke and recurrence risk, warranting vigilant screening and management.[13] Early identification and appropriate anticoagulation in atrial fibrillation could substantially mitigate stroke burden in this subgroup.

Taken together, this risk factor profile paints a picture of a population heavily burdened by preventable vascular risks compounded by insufficient secondary prevention measures. The substantial proportion of newly diagnosed hypertension and diabetes signals missed opportunities for early detection and intervention.[8,9] Addressing these gaps necessitates population-wide screening programs, strengthened primary healthcare systems and comprehensive patient education to ensure timely risk factor modification. Additionally, socioeconomic factors influence stroke incidence and outcome, as several studies demonstrate that lower socioeconomic status correlates with elevated risk factors, inferior access to care and poorer functional recovery after stroke.[14,15] These socioeconomic disparities are critical considerations in designing equitable stroke prevention and care programs.

Furthermore, urban-rural disparities in risk factor prevalence and stroke care access mirror findings in other regions, where rural inhabitants often experience higher risk factor prevalence yet face barriers to timely and adequate treatment, exacerbating stroke morbidity and mortality.[10,11] Strategies must therefore incorporate geographical considerations to reduce these inequities.

In summary, this study contributes valuable insights into demographic patterns and cardiovascular risk factors among acute stroke patients in Bangladesh. It highlights the urgent need for multifaceted stroke prevention strategies focusing on early diagnosis, effective management of hypertension and diabetes, tobacco control, cardiac disease monitoring and addressing socioeconomic and geographic disparities. Implementing such interventions could markedly reduce stroke incidence and improve outcomes in similar resource-limited settings, ultimately alleviating the considerable individual and societal burden of stroke.

The study was conducted in a single tertiary care hospital with a relatively small sample size, which may limit the generalizability of the findings to the wider population. Risk factor data were partly dependent on patient recall and medical records, which could lead to underreporting or misclassification. The cross-sectional design also precluded assessment of causal relationships and long-term outcomes.

CONCLUSION

The study demonstrated that acute stroke patients in this setting carry a high burden of modifiable cardiovascular risk factors, particularly hypertension, smoking, diabetes mellitus and cardiac diseases. A substantial proportion of these conditions were either inadequately treated or newly diagnosed at the time of stroke presentation. These findings highlight critical gaps in primary prevention and underscore the need for strengthened community-based screening, effective risk factor control and integrated cardiovascular prevention strategies to reduce the burden of stroke.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Haque A, Kadir MA, Hasan R, Saha T, Das S, Munmun F, et al. Demographic characteristics and risk factor profile of acute stroke patients. Int J Res Med Sci 2026;14:1832-6.