

Original Research Article

Pattern of stroke patients admitted at a tertiary Hospital in Bangladesh

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ABSTRACT

Background: Stroke is one of the most common causes of mortality and morbidity in Bangladesh. The purpose of the study was to understand the pattern of stroke in a tertiary care hospital in Bangladesh.

Methods: This cross-sectional study was carried out from June to November 2023 among diagnosed stroke patients. Convenient sampling was used to select the 60 patients from Chattogram Maa O Shishu Hospital, Bangladesh. A face-to-face interview was conducted using a semi-structured questionnaire. Descriptive analysis and Chi-square test were performed by IBM SPSS software.

Results: Among 60 patients, almost half (48.3%) were in the 65–84 age group. Most of the patients had HTN (81.7%) and DM (55%). About 40% of ischemic and haemorrhagic patients had arrived at the hospital before 6 hours. This study also found that only 38% of ischemic stroke patients and 20% of haemorrhagic patients had a good (13–15) GCS score. The NIHSS score was very severe (21–42) among 36% of ischemic stroke patients and 40% of haemorrhagic stroke patients. Vomiting, GCS, headache, convulsion, pulse, and diastolic blood pressure had a significant ($p \leq 0.05$) association with stroke.

Conclusions: Ischemic stroke was the predominant form of stroke, and a large number of patients arrived at the hospital on time. Rapid initiation of treatment can decrease morbidity and mortality rates significantly. So, a stroke center should be established as soon as possible to save patients' lives.

Keywords: Ischemic stroke, Haemorrhagic stroke, stroke center, NIHSS score, GCS

INTRODUCTION

Stroke is the global health issue that is becoming more prevalent worldwide. It is a cause of death, morbidity, and disability.¹ It ranks as the world's second-leading cause of death and the primary cause of acquired disability.² An estimated 15 million new cases of stroke occur worldwide each year, or one every two seconds, with two thirds of those incidents occurring in low- to middle-income nations.³ Globally, one in six people will experience a stroke at some point in their lives.⁴ Stroke patients under 50 years of age make for 5–10% of all stroke cases globally.⁵ The World Health Organization predicts that

stroke will overtake all other causes of death and disability globally by 2020, accounting for over 20 million fatalities annually, and over 24 million by 2030.⁶ Stroke incidence has climbed from 56/100,000 person-years to 117/100,000 person-years in low- and middle-income countries over the last three decades. Strokes are the third most notable cause of death in Bangladesh.⁷ The World Health Organization places Bangladesh's stroke mortality rate as 84th in the world. Bangladesh has a reported stroke prevalence of 0.3 percent. The high number of disability-adjusted life-years lost due to stroke (485 per 10,000 individuals) demonstrates how badly stroke affects Bangladesh's economy.⁸

There are two categories of stroke risk factors: modifiable and non-modifiable. The non-modifiable risk variables include age, sex, family history, and race/ethnicity; the modifiable risk factors include hypertension, smoking, diet, and sedentary lifestyle.⁹ The incidence has been rising in many developing countries, including Bangladesh, as people embrace less healthy lifestyles. Chronic, noncommunicable, and lifestyle-related illnesses have replaced poverty-related diseases in recent years due to increases in economic and demographic development.¹⁰ The standard of care for stroke patients is challenging. The main issues to be addressed are delayed hospital presentation and underdiagnosis of hypertension and other risk factors.¹¹ Bangladesh, like many other developing countries, lacks adequate resources for stroke care and rehabilitation. Significant delays in the prehospital or in-hospital phases of care, combined with insufficient case management in the country, are contributing to a poor prognosis for stroke patients.¹²

So, the purpose of this study is to determine the pattern of stroke patients admitted to a tertiary hospital in order to better understand the demand for stroke care centres.

METHODS

This cross-sectional study was carried out from June to November 2023 among diagnosed stroke patients. Convenient sampling was used to select 60 patients from Chattogram Maa O Shishu Hospital, Bangladesh. A data collection sheet was prepared as research instrument considering the variables & objectives of the study. Then it was pretested and necessary correction & changes were incorporated according to pretest result.

Inclusion criteria

The inclusion criteria included all patients who have diagnosed with stroke without any severe psychiatric conditions. The patients or their guardians provided consent, given they were capable of independent communication.

Exclusion criteria

Patients or their guardians who were unwilling or unable to provide consent were excluded from the study.

Data collection

Before collection of data all the patients were briefed about the purpose of study and informed consent was obtained. The right of refusal to participate in the study, and confidentiality of the information was gathered, was assured to each of the respondents. The data collection team was warned about the privacy of the respondents. During the study, data was collected by face-to-face interview and physical examination on a data collection sheet. After collection of data, this was checked and verified for consistency and reduction of errors.²⁰

Thereafter these data were transferred to a suitable master sheet for processing and subsequent analysis.

Statistical analysis

Data was entered to the computer and saved in Statistical Package for Social Sciences (SPSS) software version 24.00. Quality and reliability of collected data was re-checked. Appropriate Statistical analysis, calculation and test was carried out to relate variable according to the objectives of the study.

RESULTS

Table 1 shows the socio-demographic characteristics of stroke patients, where the majority of stroke patients lie in the 65–84 age groups, which is 48.3%. In the case of the gender distribution of stroke, most of the stroke patients were male, which was 61.7%. It also revealed that the majority of the patients were married (95.0%) and belonged to the upper middle class (61.7%). In terms of occupation, service, business, and homemaker were in almost the same proportion.

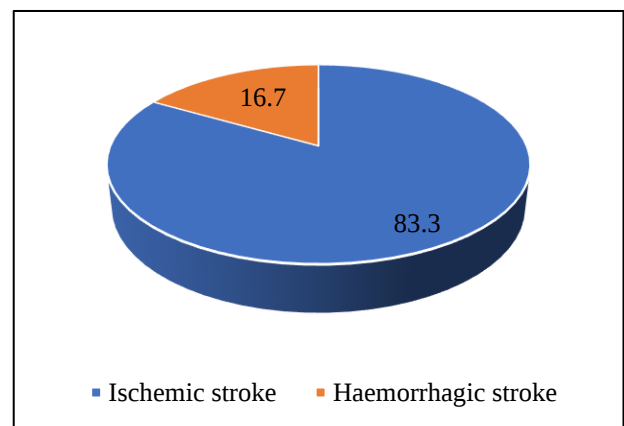


Figure 1: Type of stroke.

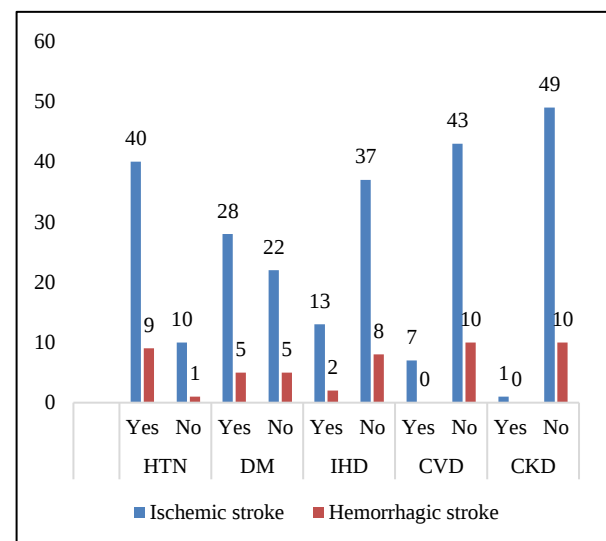


Figure 2: Distribution of risk factors by type of stroke.

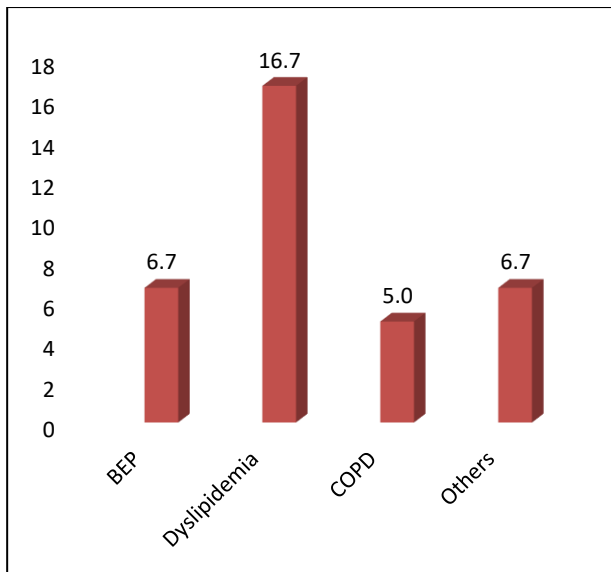


Figure 3: Others risk factors of stroke patients.

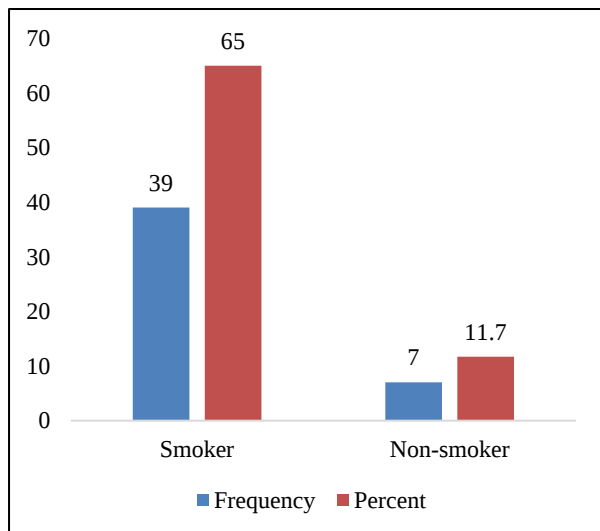


Figure 4: Smoking history of stroke patients.

The majority of the patients (83.3%) were diagnosed with ischemic stroke, whereas some (16.7) had hemorrhagic stroke (Figure 1).

About 52% of the patients with ischemic stroke were from 65-84 years age group and the rate were higher in males (58%) than females (42%). However, hemorrhagic stroke was found to have highly prevalent among patients aged between 30-49 years (50%) and the rate was also higher in males when compared to females (80% vs 20%, respectively) Patients with ischemic stroke were primarily homemakers, while most hemorrhagic stroke patients were involved in service (Table 2).

Figure 2 reveals that the most common risk factor for ischemic stroke was HTN (40), followed by DM (28), IHD (13), CVD (7), and CKD (1). HTN (9), diabetes (5), and ischemic heart disease (2) were identified as risk factors for hemorrhagic stroke. Other risk factors were dyslipidemia (16.7%), BEP (6.7%), and COPD (5%) as shown in Figure 3. Figure 4 shows most of the patients (65%) were smoker and very few were non-smoker.

Table 3 shows about 40% of both type of stroke patients came to hospital within 6 hours from onset of symptoms and majority of the patient did CT scan within 4.5hours of stroke. It also revealed that most of the hemorrhagic patient had poor GCS where in case of ischemic patient, a large number of patients had moderate to good score and GCS had significant association with type of stroke. Most of the stroke patient both ischemic and hemorrhagic had moderate NIHSS score.

Majority of the patients with hemorrhagic stroke (90%) had poor drug compliance, similar result found in case of ischemic stroke (68%). Vomiting ($p=0.012$), GCS ($p=0.028$), headache ($p=0.008$), convulsion ($p=0.002$), pulse ($p=0.032$), and diastolic blood pressure ($p=0.045$) had significant association with type of stroke. Most of the ischemic and hemorrhagic stroke patients didn't have knowledge of thrombolysis (Table 3).

Table 1: Socio-demographic characteristics of stroke patients.

Attributes		Frequency	%
Age (in years)	30-49	14	23.3
	50-64	13	21.7
	65-84	29	48.3
	>85	4	6.7
Gender	Male	37	61.7
	Female	23	38.3
Occupation	Service	19	31.7
	Business	20	33.3
	Homemaker	21	35.0
Marital status	Married	57	95.0
	Single	3	5.0
Socio-economic condition	Poor	4	6.7
	lower middle	19	31.7
	upper middle	37	61.7

Table 2: Distribution of socio-demographic characteristics by type of stroke.

Attributes		Type of stroke		Significance
		Ischemic stroke f (%)	Hemorrhagic stroke f (%)	
Age (in years)	30-49	9 (18)	5 (50)	Fisher's exact test p=0.229
	50-64	11 (22)	2 (20)	
	65-84	26 (52)	3 (30)	
	>85	4 (8)	0 (0)	
Gender	Male	29 (58)	8 (80)	χ^2 value=1.706, df=1, p=0.291
	Female	21 (42)	2 (20)	
Occupation	Service	14 (28)	5 (50)	Fisher's exact test p=0.345
	Business	17 (34)	3 (30)	
	Homemaker	19 (38)	2 (20)	
Marital status	Married	50 (100)	7(70)	χ^2 value = 15.789, df=1, p=0.004*
	Single	0 (0)	3 (30)	
Socio-economic condition	Poor	3 (6)	1 (10)	Fisher's exact test, p=0.868
	Lower middle	16 (32)	3 (30)	
	Upper middle	31 (62)	6 (60)	

f= Frequency; %= Percentage; df= Degree of freedom; χ^2 = chi square test; Significant at p $\leq$ 0.05**Table 3: Distribution of stroke event factors by type of stroke.**

Attributes		Type of stroke		Significance
		Ischemic stroke f (%)	Hemorrhagic stroke f (%)	
Time interval from onset of symptoms to arrival at hospital (hours)	< 6	20 (40)	4 (40)	Fisher's exact test p =0.439
	6-12	18 (36)	3 (30)	
	13-24	6 (12)	0 (0)	
	>24	6 (12)	3(30)	
Timing of CT scan after stroke (hours)	< 4.5	23 (46)	6 (60)	Fisher's exact test p =0.657
	4.5-12	19 (38)	2 (20)	
	13-24	6 (12)	2 (20)	
	>24	2 (4)	0 (0)	
GCS	Poor (<8)	12 (24)	7 (70)	Fisher's exact test p= 0.028*
	Moderate (8-12)	19 (38)	1 (10)	
	Good (13-15)	19 (38)	2 (20)	
NIHSS	Moderate (5-15)	20 (40)	5 (50)	Fisher's exact test p = 0.746
	Severe (16-20)	12 (24)	1 (10)	
	Very severe (21-42)	18 (36)	4 (40)	
Drug compliance	Poor	34 (68)	9 (90)	χ^2 value = 1.986 df= 1, p =0.255
	Good	16 (32)	1 (10)	
Vomiting	Yes	17 (34)	8 (80)	χ^2 value= 7.255 df= 1, p =0.012*
	No	33 (66)	2 (20)	
Weakness	RHP	31 (62)	4 (40)	Fisher's exact test, p= 0.315
	LHP	13 (26)	5 (50)	
	Absent	6 (12)	1 (10)	
Convulsion	Yes	3 (6)	5 (50)	χ^2 value = 13.962 df= 1, p =0.002*
	No	47 (94)	5 (50)	
Headach	Yes	12 (24)	7 (70)	χ^2 value = 8.149 df= 1, p =0.008*
	No	38 (76)	3 (30)	
Fever	Yes	5 (10)	0(0)	Fisher's exact test p= 0.578
	No	45 (90)	10 (100)	
Systolic pressure (mmHg)	<120	2 (4)	2 (20)	Fisher's exact test p = 0.243
	130-139	5 (10)	0 (0)	
	140-179	22 (44)	5 (50)	
	> 180	21 (42)	3 (30)	

Continued.

Attributes		Type of stroke		Significance
		Ischemic stroke f (%)	Hemorrhagic stroke f (%)	
Diastolic pressure (mmHg)	<80	2 (4)	2 (20)	Fisher's exact test p =0.045*
	80-89	13 (26)	0 (0)	
	90-120	35 (70)	8 (80)	
Pulse	<60	4 (8)	4 (40)	Fisher's exact test p =0.032*
	60-100	32 (64)	5 (50)	
	>100	14 (28)	1 (10)	
Jerks	Normal	19 (38)	5 (50)	Fisher's exact test p =0.488
	Rt exaggerated	19 (38)	3 (30)	
	Lt exaggerated	3 (6)	2 (20)	
	Absent	5 (6)	0 (0)	
	Diminished	4 (8)	0 (0)	
Planter reflex	Rt extensor	26 (32)	3 (30)	Fisher's exact test p =0.257
	Lt extensor	13 (26)	3 (30)	
	Bil extensor	4 (8)	3 (30)	
	Flexor Both	4 (8)	1 (10)	
	Absent	3 (6)	0 (0)	
Knowledge of thrombolysis	Yes	4 (8)	0	Fisher's exact test p =1.000
	No	46 (92)	10 (100)	

f= Frequency; %= Percentage; NIHSS: National institute of health stroke scale; GSC: Glasgow coma scale; df= Degree of freedom; χ^2 = chi square test; Significant at p ≤0.05

DISCUSSION

The study gathered information from 60 patients from Chattogram Maa O Shishu Hospital, Bangladesh. In the current study, 83.3% were ischemic stroke patients and 16.7% were hemorrhagic stroke patients. This study was in conflict with another Bangladeshi study that revealed 48% ischemic and 52% hemorrhagic.¹³ The rationale for this was that they limited their research to young patients. Some studies reported ischemic stroke as dominant subtypes where some reported hemorrhagic as dominant subtype.¹⁴⁻¹⁷

Patients in the 65–84 age range were mostly diagnosed with stroke, which is consistent with findings in ischemic stroke cases. However, the prevalence of hemorrhagic stroke was highest in younger patients (30–49), indicating that age is not a significant factor in stroke. The conclusion is supported by another study.⁶ This study found that most stroke patients (both ischemic and hemorrhagic stroke) were male. This probably due to their smoking history, HTN, DM and other risk factors. This male predominance in stroke patients complies with other studies.^{4,6} Stroke primarily impacted married patients; however, as only 3 patients were single, we were unable to conclude that marital status was a risk factor.

This study found that individuals from lower or upper middle class had a higher risk of stroke than did those from poorer backgrounds. Poor patients were mostly identified as stroke patients in another study.¹⁸ The high rate of hypertension among stroke patients in this study may be a result of inadequate knowledge of hypertension and inappropriate medical follow-up and treatment. Diabetes mellitus was the second comorbid condition associated with stroke. This could be because people with diabetes

are more likely to co-occur with hypertension and have greater rates of microvascular disease complications. Similar findings were reported in a different study.¹⁴ The fact that 65% of the patients in this study smoked demonstrated that smoking is a risk factor for stroke. A different study discovered that 79.5% of stroke patients smoked.¹³

Remarkably, the majority of patients (40%) reach the hospital within 6 hours of the onset of symptoms. To reduce long-term effects and maybe avoid mortality, it is advised that stroke patients arrive at the hospital within six hours after the onset of symptoms in order to obtain therapies such as tPA. Sadly, there was no stroke center, hence no patient received thrombolysis. Additionally, this study discovered that just 8% of the patients were aware of thrombolysis. In an opposite study, only 12.1% of patients arrived within the window period.¹⁸ In an additional study, only 19.7% of patients were hospitalized in less than six hours.¹⁹ Morbidity and death rates can rise when patients arrive late to the hospital.

The most crucial tool for identifying stroke subtypes and initiating targeted treatment is a CT scan. Nearly half of the participants in this study underwent CT scanning within 4.5 hours after the stroke symptoms began. According to a conflicting study, only 34.4% of patients had a CT scan within three days of checking into a hospital.¹⁸ About two-third (70%) of hemorrhagic patients had poor GCS compared to 24% of ischemic stroke. Similar findings were discovered in another study that around two-thirds (66.7%) of ischemic stroke patients had good GCS compared to 46.4% of HS patients.¹⁸ In this study, 40% of patients had moderate neurological deficit (NIHSS 5–15) at the time of admission for ischemic stroke, and 50% for hemorrhagic stroke. In case of clinical

presentation, majority of hemorrhagic patients arrived with headaches, vomiting, and elevated blood pressure. The primary symptoms at admission in the event of an ischemic stroke were tachycardia, elevated blood pressure, and right hemiplegia. Another study found most stroke patient had high blood pressure but normal pulse rate.¹⁸

This study has several limitations that should be acknowledged. First, the single-center, cross-sectional design inherently limits the generalizability of the findings to broader populations, as the data may not fully represent the geographic, socioeconomic, and clinical diversity of stroke patients in Bangladesh. Furthermore, the restricted sample size may restrict the ability to comprehensively capture the full heterogeneity of stroke presentations across diverse demographic and clinical subgroups. These methodological constraints underscore the necessity for future research to prioritize multi-center, longitudinal investigations with larger, population-based cohorts to validate and extend these findings.

CONCLUSION

Stroke patients are increasing day by day because of sedentary lifestyles and unawareness. In this study, the prevalence was much higher in the elderly and male population. More than three fourth had an ischemic stroke. Hypertension, diabetes, ischemic heart disease, dyslipidemia, smoking were the most common risk factors observed among stroke patients. In this study, we discovered that the majority of patients arrived at the hospital within a window of time and were scanned early, allowing us to diagnose the patient with a stroke early on. They scored reasonably well on the NIHSS and GCS. Therefore, we may conclude that we could treat stroke patients with thrombolysis and likely save more lives if we had a stroke center inside our facilities. No longer is a stroke center optional; it is essential.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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