Clinico-Epidemiological Profile and Outcome at Discharge of Stroke Patients Admitted to A Tertiary Hospital in Chattogram, Bangladesh

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Abstract

Background: Regularly updated data on stroke and its pathological types, including data on its incidence, prevalence, mortality, disability, risk factors, and epidemiological trends, are essential for evidence-based stroke care planning and resource allocation. The study aimed to determine the sociodemographic features, risk factors, and outcomes of stroke patients admitted to a tertiary hospital in Chattogram, Bangladesh.

Materials and methods: This prospective observational study include purposively selected 308 admitted stroke patients from the Department of Neurology of Chittagong Medical College Hospital (CMCH) from January 1, 2022, to April 31, 2022. Subgroup analysis between Ischemic Stroke (IS) and Hemorrhagic Stroke (HS) patients were done.

Results: Mean age was 60.8 years and 52.9% were male. IS and HS was found respectively, among 78.9% and 21.1% of the patients. The most common risk factors were hypertension (76.3%) smoking (45.5%) diabetes (35.4%) dyslipidemia (33.1%) central obesity (28.2%) family history of stroke (24.4%) and ischemic heart disease (20.1%). Hypertension (p<0.001) and alcohol drinking habit (p=0.008) were more common among HS and diabetes (p<0.001) and dyslipidemia (p=0.002) were more common among IS patients than their counterpart. Most of the

patients (222/308, 42%) had their mRS score of 3 to 5 during discharge. Male sex (OR: 1.72, 95% CI: 1.02 to 2.89) and hypertension (OR: 2.20, 95% CI: 1.89 to 3.87) were independently associated with poor outcome on discharge.

Conclusion: Most of the patients had moderate to severe disability at discharge. Hypertension is the most important risk factor and predictor of poor outcome.

Key words: Hemorrhagic stroke; Ischemic stroke; Outcome; Risk factors.

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Introduction

Data from the World Health Organization (WHO) in 2021 indicates that stroke accounts for 18.75% of total deaths keeping it at the top of the list of 'leading causes of death in Bangladesh,' which ranks mortality due to stroke in Bangladesh as number 41 in the world.[1] According to Bangladesh Bureau of Statistics the number of deaths from strokes almost doubled in 2020 compared to 2019. In 2020 as many as 85,360 people died of brain strokes against 45,502 in 2019.[2] Stroke is the most common condition among neurology in-patients (48%) and out-patients (24%) of Bangladesh.[3,4] Without the urgent implementation of effective primary prevention strategies, the stroke burden will probably continue to grow across the world, particularly in low to middle-income countries like Bangladesh.[5]

Considering the epidemiologic shift and weak public health reporting mechanism, making a judicious policy to mitigate the stroke burden is a mammoth task in Bangladesh given the low healthcare expenditure.[6] WHO recommends three-step approach to establish stroke surveillance system. First step should capture data about stroke in the hospital giving information about treatment and mortality of the stroke patients. In the subsequent steps, WHO recommend capturing stroke related fatal and nonfatal events in the community.[7] Experiences from the region have recommended establishing a hospital based surveillance system.[8] Establishing such a system for low and middle income countries in the community might be challenging because of the cost implications.[8,9] Studies done on stroke in Bangladesh have quantified the prevalence of stroke but studies collected information on limited number of the relevant variables.[10]

Several studies identified and quantified a linkage between the time trend in stroke incidence and the temporal changes in classic Cardiovascular Disease (CVD) risk factors.[11-13] In Bangladesh, few hospital-based studies have investigated the stroke risk factors. Hypertension, diabetes mellitus, smoking, ischemic heart diseases, and dyslipidemia are main reported stroke risk factors in Bangladesh.[14-16] To the best of our knowledge no such epidemiological data are available in the study site, especially in the recent time. Chittagong Medical College Hospital (CMCH) is the second largest public tertiary hospital of Bangladesh. Stroke patients are referred from the southeastern part of the country to this hospital for management. In the absence of community based epidemiological data, hospital-based data could be able to provide critical insight into the important aspects of stroke patients. In this scenario updated information regarding burden of various types of strokes and their risk factors is critical for evidence-based resource allocation at health care centers. In this background, the current study was aimed to characterize the stroke patients and their discharge outcome of a series of patients presenting with clinical stroke to CMCH.

Materials and methods

This prospective observational study was conducted in the Department of Neurology, CMCH, Chattogram, Bangladesh, from January 1, 2022, to April 31, 2022. The Ethical Review Committee approved the study protocol of Chittagong Medical College. Informed consent was obtained from the caregivers of the patients.

Diagnosed cases of stroke (Based on findings from Neuroimaging-either of CT or MRI) were included in the study. Subjects with acute stroke and focal neurological deficit lasting <24 hours, expired in hospital during their index admission, primary sub-arachnoid hemorrhage and the co-existing acute coronary syndrome were excluded from the study.

Demographic and clinical data were collected by using a structured case record form.Diabetes, hypertension, ischemic heart disease, and dyslipidemia was labeled as previously diagnosed if the patient already had a diagnosis by registered physician and taking medications or as newly diagnosed based on the admission examination

and laboratory findings. In-hospital outcome was dichotomized based on discharged modified Rankin Scale (mRS) score, mRS score ≤2 was considered as a favourable functional outcome and mRS score 3-6 was considered as an unfavourable functional outcome.[17]

Data were analyzed using SPSS version-23 software. Quantitative data were expressed as either mean and standard deviation or median (Interquartile range) and between groups differences were tested by either by Independent sample t-test or Mann-Whitney U test. Qualitative data were expressed as a percentage and compared between groups by Chi-square or Fisher's exact test. Logistic regression analysis was used to assess the independent contribution of variables statistically significant on univariate analysis in the prediction of outcome. p value <0.05 was taken as statistical significance.

Results

During the study period, total 308 cases were found to meet eligible criteria and included in the final analysis. Among them 243 (78.9%) had ischemic and 65 (21.1%) had hemorrhagic stroke. Table I shows that, mean age of the stroke patients was 60.8 years and 52.9% were male. Most of them were Muslims, came from rural area, had no formal education, and had monthly income between 11,000-20,000 takas. The mean age of the HS patients was higher than IS patients, and HS was more frequent among male, rural residents, among people with monthly income ≤10,000 takas, and non-Muslims than their counterparts (Table I). However, only the association between low monthly family income and HS was significant statistically (p=0.030).

Table I Sociodemographic characteristics of the patients stratified by stroke type

Variables	Total (n=308)	Ischemic stroke (n=243)	Hemorrhagic stroke (n=65)	p value
Age, years	60.8±13.4	60.5±13.7	61.9±12.1	0.450[†]
Sex				
Male	163 (52.9)	122 (50.2)	41 (63.1)	0.065[*]
Female	145 (47.1)	121 (49.8)	24 (36.9)	
Residence				
Rural	202 (65.6)	153 (63.0)	49 (75.4)	0.061[*]
Urban	106 (34.4)	90 (37.0)	16 (24.6)	
Educational level				
No formal education	167 (54.2)	134 (55.1)	33 (50.8)	
Below SSC	92 (29.6)	71 (29.2)	21 (32.3)	0.819[*]
SSC & above	49 (15.9)	38 (15.6)	11 (16.9)	

Variables	Total (n=308)	Ischemic stroke (n=243)	Hemorrhagic stroke (n=65)	p value
Monthly family income				
≤10,000 tk	78 (25.3)	55 (22.6)	23 (35.4)	
11,000-20,000 tk	155 (50.3)	122 (50.2)	33 (50.8)	0.030*
>20,000 tk	75 (24.4)	66 (27.2)	9 (13.8)	
Religion				
Islam	263 (85.4)	212 (87.2)	51 (78.5)	0.075*
Otherers	45 (14.6)	31 (12.8)	14 (21.5)	

Data were expressed as either frequency (%) or mean±SD. †Independent sample t test, *Chi-square test. Significant p value was in Bold face.

Hypertension, smoking, diabetes, dyslipidemia, central obesity, family history of stroke, and ischemic heart disease were common risk factors in this series. Hypertension and alcohol drinking habit were more common among HS and diabetes, and dyslipidemia were more common among IS patients than their counterpart (Table II).

Table II Traditional risk factors of stroke stratified by stroke type

Variables	Total (n=308)	Ischemic stroke (n=243)	Hemorrhagic stroke (n=65)	p value
Hypertension	235 (76.3)	173 (71.2)	62 (95.4)	<0.001*
Current or Ex-smoker	140 (45.5)	108 (44.4)	32 (49.2)	0.491*
Diabetes mellitus	109 (35.4)	100 (41.2)	9 (13.8)	<0.001*
Dyslipidemia	102 (33.1)	91 (37.4)	11 (16.9)	0.002*
Central obesity	87 (28.2)	65 (26.7)	22 (33.8)	0.259*
F/H of stroke	75 (24.4)	61 (25.1)	14 (21.5)	0.552*
Ischemic heart disease	62 (20.1)	50 (20.6)	12 (18.5)	0.706*
OCP exposure[a]	26 (17.9)	20 (16.5)	6 (25.0)	0.323*
Generalized obesity	39 (12.7)	29 (12.0)	10 (15.4)	0.465*
Sedentary lifestyle	23 (7.5)	17 (7.0)	6 (9.2)	0.543*
Alcohol habit	13 (4.2)	6 (2.5)	7 (10.8)	0.008**

Data were expressed as either frequency (%) or mean±SD. †Independent sample t test, *Chi-square test. **Fisher's exact test. Significant p values were in bold face. [a]Female only.

Table III shows that, length of hospital stay was significantly longer for the HS patients than the IS patients. During discharge near about three-fourth (72%) of the patients were in poor functional status.

Table III In-hospital stay, and discharge outcome of the stroke patients stratified by stroke type

Variables	Total (n=308)	Ischemic stroke (n=243)	Hemorrhagic stroke (n=65)	p value
Length of hospital stay	4 (2-5)	3 (2-5)	5 (3-7)	0.008†
mRS on discharge	3 (2-4)	3 (2-4)	3 (2-4)	0.889†
Discharge outcome				
Good	86 (27.9)	68 (27.7)	18 (27.7)	0.693*
Poor	222 (72.0)	175 (72.0)	47 (72.3)	

Data were expressed as either frequency (%) or median (Interquartile range). †Mann-Whitney U test; *Chi-square test, **Fisher's exact test. Significant p value wasin bold face.

Compared to patients with unfavorable outcomes, patients with favorable outcomes at discharge were significantly younger, male, had hypertension (Table IV). On the other hand, other risk factors of strokes had no significant association with discharge outcome.

Table IV Factors associated with poor functional status assessed by mRS score at discharge

Variables	Favourable outcome (n=86)	Unfavorable outcome (n=222)	p value
Age, years	58.3±15.5	61.8±12.4	<0.001†
Male sex	54 (62.8)	109 (49.1)	0.031
Hemorrhagic stroke	18 (20.9)	47 (21.2)	0.963
Current or Ex-smoker	41 (47.7)	99 (44.6)	0.626
Hypertension	55 (64.0)	180 (81.1)	0.002
Diabetes mellitus	25 (29.1)	84 (37.8)	0.149
Alcohol habit	7 (8.1)	6 (2.7)	0.053**
Dyslipidemia	24 (27.9)	78 (35.1)	0.227
F/H of stroke	21 (24.4)	54 (24.3)	0.987
Ischemic heart disease	13 (15.1)	49 (22.1)	0.172
Generalized obesity	10 (11.6)	29 (13.1)	0.724
Abdominal obesity	21 (24.4)	66 (29.7)	0.353

Data were expressed as either frequency (%), mean±SD. †Independent sample t test, *Chi-square test. Significant p values were in bold face.

When poor outcome was defined as mRS >2, logistic regression analysis identified that male sex (OR: 1.72, 95% CI: 1.02 to 2.89) and hypertension (OR: 2.20, 95% CI: 1.89 to 3.87) as independent predictors of poor outcome at discharge (Table V).

Table V Independent predictors of poor discharge outcomes among stroke patients

Variables	B	Wald	p value	OR	95% CI for OR Lower	Upper
Age, years	0.017	2.978	0.084	1.017	.998	1.037
Male sex	0.541	4.137	0.042	1.718	1.020	2.893
Hypertension	0.786	7.407	0.006	2.195	1.246	3.865

OR: Odds Ratio, CI: Confidence Interval, Significant values were in bold face.

Discussion

The present study provides useful recent information related to stroke types, risk factors, outcomes, and stroke type-based differences

among stroke patients enrolled at the largest tertiary center in Chattogram, Bangladesh.

Mean age of the stroke patients which is around sixty years is consistent with findings from other studies conducted in and around our country.[16-19] In contrast, most of the patients from a stroke registry in USA presented with stroke at an age of 71 years.[20] In this study there was a small male predominance among stroke patients, which agreed with other studies including western ones.[16-21]

Regarding the socioeconomic characteristics, most of the stroke patients in the present series came from rural area, had no formal education, and had monthly income between ≤20,000 takas. The latest evidence on socioeconomic status and stroke shows that stroke disproportionately affects socioeconomically deprived populations. These disparities are reflected not only in risk of stroke but also in short-term and long-term outcomes after stroke. Increased average levels of conventional risk factors in populations with low socioeconomic status account for about half of these effects.[22]

The most common risk factors were hypertension (76.3%) smoking (45.5%) diabetes (35.4%) dyslipidemia (33.1%) central obesity (28.2%) family history of stroke (24.4%) and ischemic heart disease (20.1%). Among the risk factors, hypertension and alcohol drinking habit were more common among HS and diabetes and dyslipidemia were more common among IS patients than their counterpart. Epidemiologic studies consistently have demonstrated a dramatic reduction in the incidence and mortality of all stroke types with good control of hypertension, and it appears that all effective antihypertensive agents have similar efficacy in their ability to reduce stroke risk.[23] Hypertension was revealed as an independent predictor of poor functional outcome during discharge in the present study. The association between stroke and hypertension is particularly alarming for Bangladesh, where among adults the prevalence of hypertension has increased significantly, and there is no subgroup where it is decreasing.[24]

Another alarming important finding of the present study was that near about three fourth of the stroke patients discharged from the hospital in a poor functional status. This could be due to high patient burden in the study site and limited modern treatment facilities. Stroke care services in Bangladesh, including stroke physicians and rehabilitation services, especially in the rural areas, are very limited.[25] So, the stroke patients are likely to suffer from a poor quality of life along with their families.

Limitation

We were unable to see the in-hospital mortality, follow up and assess outcome of patients in the long-term. Since the study was carried out in a single hospital, it may not represent the general population.

Conclusion

Commonly recognized risk factors, such as hypertension, smoking, diabetes, dyslipidemia, obesity, and family history of stroke were frequently found in our population. Majority of the stroke patients in were discharged home with a state of poor functional status. Hypertension is the most prevalent risk factor and independent predictor of poor functional outcome during discharge.

Recommendation

The present study has highlighted the need for strengthening preventive strategies for hypertension to reduce stroke-related morbidity in Bangladesh. Large, multicenter studies with nationally representative distribution pattern are required to plan population-based interventions.

Contribution of authors

AA-Conception, acquisition of data, data analysis, drafting & final approval.

MR-Data analysis, critical revision & final approval.

SAU-Interpretation of data, drafting & final approval.

MRK-Data analysis, critical revision & final approval.

SMA-Acquisition of data, data analysis, drafting & final approval.

KH-Acquisition of data, critical revision & final approval.

FM-Data analysis, critical revision & final approval.

MHK-Interpretation of data, drafting & final approval.

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MH-Interpretation of data, critical revision & final approval.

Disclosure

All the authors declared no conflicts of interest.

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