

Post-Stroke Complications and Consequences among the Patients in Dhaka Medical College Hospital

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ABSTRACT

Background: Medical complications are important problems after acute stroke and present potential barriers to optimal recovery. Sometimes patients die not from stroke but from complications. Several studies have undertaken regarding this topic. However, considering fewer studies in this country incites the mind to perform a prospective study of assessing the complications and outcomes among post-stroke patients admitted to Dhaka Medical College Hospital (DMCH).

Materials and methods: This cross-sectional study was carried out at the DMCH's Department of Medicine and Neurology during 2018-2019 period. The study had a six-month duration and formal ethical approval was obtained from the DMC Ethical Review Committee (ERC) prior to study initiation. For the purpose of this study, patients who had been admitted to DMCH due to an acute stroke were approached and monitored for a period of seven days. All clinical data, vital signs and sociodemographic details were gathered at the time of admission. Additionally, comorbidities and risk factors were entered into a case record form. 200 post-stroke patients were selected as case. Every participant provided written, informed consent and the entire study was conducted under strict adherence to ethical guidelines. After data collection, SPSS version 20 was used to analyze the data.

Results: Among 200 acute stroke patients, the Majority (66%) of the respondents were male and 34% were female. The mean age was 59.62±12.02 years, with a minimum recorded age of 35 years and a maximum recorded age of 83 years. About 54% lived in urban areas and 46% were in rural areas. About 90% had ischemic stroke and 10% had hemorrhagic stroke. Among the medical complication, chest infection was the most prevalent 91(46%) and among neurological complication, seizures were the most prevalent 31(15.5%). Development of complication is related to the type of the stroke (Hemorrhagic 85% vs Ischemic 51.1%, p<0.05).

Conclusion: Complications are common in stroke patients, both medical and neurological complications are predominantly related to hemorrhagic stroke.

Key words: Haemorrhagic stroke; Ischemic stroke; Post stroke; NIHSS score.

Introduction

Bangladesh has recently been classified as a lower-middle-income country and anticipates advancing to the

status of a middle-income country by 2026.¹ Sustainable economic growth is unattainable without tackling non-communicable diseases, as they significantly contribute to disability and impose an inconvenience on health systems.² Around 80% of NCD death occurs in Low and Middle-Income Countries (LMICs).³ Stroke among NCDs causes most deaths and disabilities worldwide. Stroke strikes 10.3 million people annually, devastating 6.5 million and leaving 26 million disabled.⁴ Epidemiological change has made NCDs the leading cause of death for 30 years, replacing infectious and parasitic diseases. Limited available data suggest that in Bangladesh, around 51% death occurs due to NCDs.⁵ Bangladesh has the ninth-highest age-standardized mortality rate from chronic diseases, mostly cardiovascular disease and diabetes.⁶ Brain oedema and hemorrhagic transformation are neurological complications of acute ischemic stroke that could impact outcomes and have serious short-term and long-term consequences. These problems arise earlier than medical complications. Additional neurological issues that can arise from an acute ischemic stroke

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include epilepsy, seizures, confusion, headaches, central post-stroke discomfort, sleep disorders and sleep-disordered breathing.⁷ Intracerebral Haemorrhage (ICH) is the most catastrophic kind of stroke and a primary contributor to disability and mortality. ICH consequences including Haematoma Expansion (HE), Perihematomal Oedema (PHE), Intraventricular Haemorrhage (IVH) with hydrocephalus, seizures, venous thromboembolic events and hyperglycemia. Complications including HE, IVH with obstructive hydrocephalus and hyperglycemia are significant predictors of heightened early mortality and unfavourable outcomes during the hyperacute phase of ICH. Likewise, hydrocephalus and post-hemorrhagic hydrocephalus have been linked to early neurological decline and unfavourable outcomes.⁸ Hypertension, hypercholesterolaemia, carotid stenosis and atrial fibrillation are known to be causal risk factors for stroke.⁹ Cigarette smoking, excessive alcohol use, insulin resistance and diabetes mellitus are also likely causal risk factors.⁹ The probability that a patient would recover from a stroke is significantly predicted by their NIH Stroke Scale (NIHSS) score. Whereas a score of $<$ or $=6$ indicates a fair recovery, a score of $>$ or $=16$ indicates a significant probability of death or serious impairment.¹⁰ Baseline NIHSS scores on admission are associated with chronic functional outcome, infarct volume, hospital disposition after stroke and angiographic findings.¹¹

Materials and methods

This hospital-based cross-sectional observational study was carried out in the Outpatient Department of Medicine and in the Department of Neurology at Dhaka Medical College Hospital. The study was conducted from Sep 2018 to March 2019. The study was undertaken after approval by the Ethical Review Committee of Dhaka Medical College and the concerned Departments. Informed consent was obtained from each patient.

After conducting non-probability purposive sampling methods, 200 acute stroke patients were selected.

Inclusion and Exclusion criteria

Clinically diagnosed cases of acute stroke, aged more than 18 years and who had given consent to participate were included in this research. Patients who had TIA and previous history of stroke were excluded from data collection.

IBM-SPSS v25.0 for Windows analysed and evaluated all the data. A p-value < 0.05 indicates statistical significance. Values were presented as mean, SEM, SD. The Kolmogorov-Smirnov Test checked for data normality and a p-value larger than 0.05 showed non-

significant result. At $p < 5\%$, 95% confidence was considered statistically significant. For continuous data, patient characteristics were given as percentages or mean \pm standard deviation. For categorical variables, percentage and frequency distribution were employed.

Results

Table I Distribution of respondents according to age (n=200)

Age range (Years)	Frequency (%)	Mean age (Years)	Minimum age (Years)	Maximum age (Years)
31-40	12(6)			
41-50	40(20)			
51-60	52(26)	59.62 \pm 12.02	35	83
61-70	72(36)			
71-80	24(12)			
Total	200(1000)			

Above Table reflects that 72(36%) were of 61-70 years, (31-40) years were 12(6%), Mean age was 59.62 \pm 12.02 years.

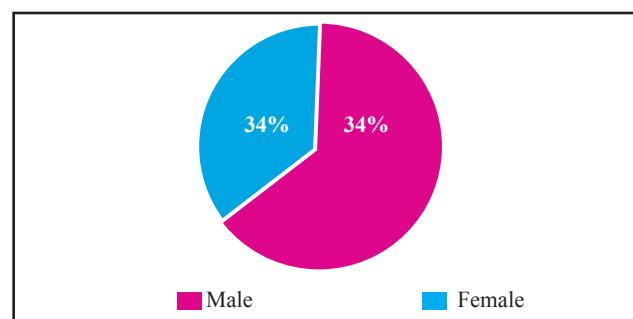


Figure 1 Gender of the respondent patients (n=200)

Out of 200 responding patients 132(66%) were male and the rest 68(34%) were female.

Table II Risk factors observed among the patients (n=200)

Risk factors	No.	%
Family history of stroke	72	36
Smoking	76	38
Alcohol	20	10
Hypertension	112	56
Atrial Fibrillation	28	14
Coronary artery disease	40	20
DM	48	24
Dyslipidemia	92	46

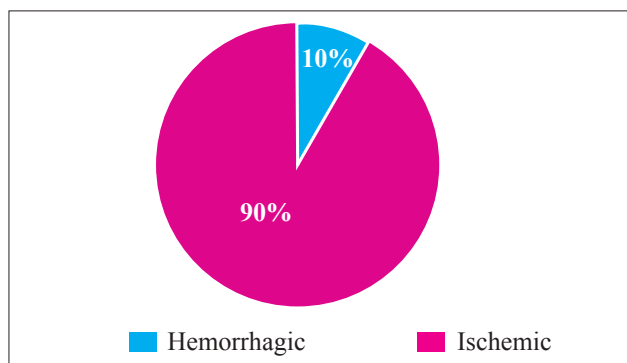
Majority 112(56%) patients were hypertensive, 76(38%) had habit of smoking, 92(46%) had dyslipidemia and 72(36%) mentioned family history of stroke.

Table III Modified Rankin Score (mRS) of the stroke patients (n=200)

mRS scale score□	No (%)□	Mean score
0□	24(12)□	2.66±2.226
1□	72(36)□	
2□	24(12)□	
3□	12(6)□	
4□	12(6)□	
5□	8(4)□	
6□	48(24)□	
Total□	200(100%)	

Table III showing mean mRS scale score was 2.66 ± 2.226 and minimum score was 0, and maximum score was 6.□

mRS 6 score observed among 48(24%) of the patients. Majority 72(36%) had only mRS 1 score. 0 and 2 mRS scores were found in both cases among 24 patients.

**Figure 2** Types of the patients (n=200)

Almost all, 180(90%) had ischemic stroke and the remaining 20(10%) had hemorrhagic stroke.

Table IV Distribution of respondents according to complications after stroke (n=200)

□	Stroke frequency (%)
A. Medical Complication	
Chest infection□	92(46)
UTI□	37(18.5)
Fever□	28(14)
Pain□	37(18.5)
Pressure sore□	6(3)
Falls□	43(21.5)
Depression□	41(20.5)
Thromboembolic (DVT, Pulmonary embolism)□	8(4)
MI□	4(2)
CCF□	4(2)
Cardiac arrest□	4(2)

□	Stroke frequency (%)
GI bleed□	6(3)
Urinary incontinence□	10(5)
Hyperglycemia□	15(7.5)
B.Neurological complications	
Seizures□	31(15.5)
Hydrocephalus□	8(4)
Perihematomal oedema□	12(6)
Hematoma expansion□	7(3.5)

Among medical complications chest infection was the most prevalent 92(46%) and among neurological complications seizures was the most prevalent 31(15.5%).

Table V Complications among ischemic and hemorrhagic strokes (n=200)

Stroke type□	Complications□		p value
□	Present□	Absent	
□	n(%)□	n(%)□	
Ischemic□	92(51.1)□	88(48.9)□	<0.05
Hemorrhagic□	17(85)□	3(15)	

**p value determined by Pearson Chi-square ($\chi^2 = 7.92$)

Among ischemic stroke 51.1% had complications and among hemorrhagic complications, 85% had complications. There is a significant ($p < 0.05$) difference between two categories of stroke.

Discussion

Patients with severe, disabling strokes are particularly vulnerable. Medical complications can hinder functional recovery and are associated with poorer functional outcomes after adjusting for stroke severity and age.^{12,13}

This study includes 100 post-stroke patients. The mean age of the responders was 59.62 ± 12.02 years. 36% of the individuals were aged between 61 and 70 years. 26% were aged 51-60 years, 20% were aged 41-50 years, 12% were aged 71-80 years, and 6% were aged 31-40 years. A total of 52% were at or below 60 years of age, while 48% of respondents were above 60 years of age. A study by Civelek et al. in a tertiary rehabilitation center associated with Baskent University Hospital in Turkey revealed a mean patient age of 66.5±10.3 years. A study conducted by Wang et al. indicated that the mean age of patients experiencing difficulties in post-stroke was 70±12 years. 73.1% were aged 65 years or older, while 26.9% were under 65 years of age. These results differ from those of this study. This may be attributed to variations in geographical regions and disparities in study populations, as life expectancy differs between the countries.^{14,15}

Hypertension (56%), dyslipidaemia (46%), smoking (38%) family history of stroke (36%), diabetes (24%), coronary artery disease (20%), atrial fibrillation (14%) and alcohol (10%) were the most common risk factors. A retrospective study by Civelek et al. at a tertiary rehabilitation centre found that 69.1% of patients had hypertension, 39.5% had ischaemic heart disease, 33.3% had diabetes, 22.2% had hyperlipidaemia and similar had arrhythmia, 14.6% had myocardial infarction, 11.1% had congestive heart failure and 2.5% had COPD. Another study by Wang et al. found that 57.2% had hypertension, 7.7% had hyperlipidaemia, 13.6% had diabetes, 18.7% had coronary heart disease, 26% had atrial fibrillation, 1.9% had TIA, 8.3% had family history of stroke, 28.7% were on anticoagulants and 5.2% were on thrombolytics. These findings support this study.^{14,15} Of 100 respondents mean mRS six scale score was 2.66 ± 2.226 and minimum score was 0 and maximum score was 6. 60% had Modified Rankin scale 0-2. Study by Langhorne et al. reported that of 311 patients, 229(74%) had modified Rankin score 0-2. Another study by Weimar et al. reported 93.2% patients had Rankin scale score <3 . These findings support the findings of this study.^{13,16}

Medical complications included 46% chest infections, 18.5% UTI, 14% fever, 18.5% pain, 3% pressure sore, 21.5% repeated fall injury, 20.5% depression, 4% thromboembolic events like DVT, pulmonary embolism, 2% MI, 2% CCF, 2% cardiac arrest, 3% GI bleeding, 5% urinary incontinence and 7.5% hyperglycemia. Neurological problems included 15.5% seizures, 4% hydrocephalus, 6% perihematomal oedema and 3.5% haematoma growth. Report by Civelek et al. stated that 9 (11.1%) of the 81 individuals had no problems, whereas 72 (88.9%) experienced at least one. The 5 most prevalent problems were UTI (48.1%), shoulder discomfort (37.0%) sleeplessness (37.0%) depression (32.1%) and musculoskeletal pain other than shoulder (32.1%). UTIs occurred in 78.9% of patients with an indwelling urinary catheter on arrival and 39.3% of those without ($p=0.003$). In a prospective trial by Hong et al. 24.3% had complications, including 12% chest infection, 9% urinary tract infection, 2% fever, 3.3% pressure sore, 2.2% repeated falls and 1.9% myocardial infarction. In the first week, 312 of 489 patients (63.8%) had problems, according to Indredavik et al. Pain in 117 (23.9%), temperature 38 degrees C or higher in 116 (23.7%), progressing stroke in 90 (18.4%), urinary tract infection in 78 (16.0%), troponin T elevation without criteria of myocardial infarction in 57 (11.7%), chest infections in 55 (11.2%), non-serious falls in 36 (7.4%)

and myocardial infarction in 22 (4.5%) were the most common complications. At 3-month follow-up, 201 of 244 patients (82.4%) had at least one problem, with pain in 134 (54.91%), urinary tract infection in 68 (27.9%) and non-serious falls in 61 (25.0%). These findings support this study.^{17,18,19} Out of 200 respondents with ischaemic stroke, 92(51.1%) had complications and among hemorrhagic stroke, 17(85%) had complications ($p<0.05$). Langhorne et al. reported among the patients 19% died in hospital, 29% by the 6 month follow-up, 42% by 18 months.

Limitation

- This was a single-centre study
- Long-term follow-up was beyond the scope of the study.

Conclusion

Both medical and neurological complications developed in either type of stroke. Among the medical complications, chest infection was the most common whereas among neurological complications, seizure was the most common. Moreover, it was observed that hemorrhagic stroke patients were more prone to develop complications than ischemic stroke patients, the difference was significant($p<0.05$).

Recommendations

Depending upon the study findings, following recommendations are suggested:

- These findings could be used as a guideline for stroke patient management.
- Hemorrhagic stroke patients should be managed with cautious, care as they are more prone to develop complications
- More extensive cohort study is recommended.

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Disclosure

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