



## An Assessment of the Risk Factors of Stroke in Different Socio Economic Groups in Dhaka, Bangladesh

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Received: 17 April 2021

Revised: 27 May 2021

Accepted: 08 June 2021

Published: 21 August 2021

### Abstract

**Background:** The global epidemic of stroke is not only the public health concern in high-income countries but also nearly 85% of all stroke deaths are recorded in low- and middle-income countries. Which results in 87% of total losses caused by stroke in terms of DALYs, measured, globally, in 72 million per year. **Aim:** To identify the common risk factors of stroke among the Bangladeshi people and pay attention on it. **Methods:** This cross-sectional analytical study was conducted in Mirpur of Dhaka city during November 2018 to April 2019. A total of 350 participants were included for the study. Non-probability convenient sampling was used. Collected data were analyzed by computer technology SPSS version 22.0. Permission from ethical review committee of Gono Bishwabidyalay was taken. **Results:** Out of 350 participants, 141 (40.3%) number of participants were in 55-64 age group which was followed by 115(32.9%), 45(12.9%), 36(10.3%), 13(3.7%) of 45-54 age group, 35-44 age group, ≥65 age group and 25-34 age group respectively. Majority of the participants were male 230(65.7%) and rests of them were female 120(34.3%). Most of the participants (72.9%) comprises high-income group followed by middle-income group (25.4%) and low-income group (1.7%). Duration of smoking habit have found significantly higher among the ischemic stroke (88%) compared to hemorrhagic stroke (12%),  $p < 0.05$ . 76.3% respondents were hypertensive. **Conclusions:** Almost all study in Bangladesh showed that stroke affects mainly illiterate people but in this study find out that stroke occurs majority in literate person who completed HSC level of education and above. This study also finds that stroke incidence is more in high-income group in Bangladesh.

**Keywords:-** Stroke, Risk Factors, Socio Economic, Health, Concern.

## INTRODUCTION

The global epidemic of stroke is not only the public health concern in high-income countries but also nearly 85% of all stroke deaths are recorded in low- and middle-income countries. Which results in 87% of total losses caused by stroke in terms of DALYs, measured, globally, in 72 million per year.<sup>[1]</sup> Worldwide over the past four decades, the annual age-standardized stroke incidence rate has decreased by 1.1% in high-income countries.<sup>[2]</sup> However, has increased by 5.3% in low to middle-income countries.<sup>[3]</sup> Stroke is widely recognized as a major cause of disability among adults and is the most common cause of dependence in activities of daily living (ADLs) among the elderly. Approximately 90% of stroke survivors have permanent neurological deficits. Two thirds of stroke survivors require rehabilitation, and 50% do not regain their independence.<sup>[4]</sup> Recent studies suggest that between one-fourth and one-third of stroke patients experience persistent dependency in one or more activities of daily living (ADL's) by 6 months after their strokes. Bangladesh is currently undergoing both epidemiologic and demographic transitions, where the decline in both fertility and mortality rates in early life have resulted in increased life expectancy. According to the estimation of the United Nations, life expectancy at birth is expected to increase to 74 years in 2025 in Bangladesh.<sup>[5]</sup> Bangladeshi men tend, however, to have a high prevalence of diabetes, smoking, physical inactivity, and high serum triglyceride concentrations, and low serum high-density lipoprotein cholesterol concentrations.<sup>[6]</sup> For women, the burden from these risk factors is also high, except for smoking, which is uncommon. A population-based case-control

study of 1250 stroke deaths in rural Bangladesh present that risk of stroke death have significantly increased with hypertension, diabetes mellitus betel consumption when adjusted for age and sex.<sup>[7]</sup> Bhopal et al,<sup>[8]</sup> propose that the explanation for high rates of stroke in Bangladeshis lies in their heavier burden of some established risk factors, their socioeconomic deprivation, and some novel risk factors that are yet to be characterized. Pending deeper understanding of the causes, doctors should be aware of the high risk of stroke and stroke fatality in Bangladeshis even in the absence of raised blood pressure. There is a high modifiable burden of risk factors for adult stroke deaths in rural Bangladesh, most notably including hypertension. The public health burden of young age stroke is high in these populations because of a relatively greater loss of productivity and wage-earning years.<sup>[9]</sup> To lessen the financial burden of stroke in a low-income country like Bangladesh prevention could be the best way and the recognition of amendable risk factors is vital.<sup>[10]</sup> The current study search for recognize the risk factors of stroke among different socio-economic group in Bangladesh.

### Objectives

- General objective:
  - To assess the risk factors of stroke among different socio-economic group.
- Specific Objectives:
  - To assess socio-economic status.
  - To find out the risk factors of stroke.
  - To show relationship between risk factors and socio-economic status.

## MATERIAL AND METHODS

This cross-sectional analytical study was conducted in Bangabandhu Sheikh Mujib

Medical University Hospital during November 2018 to April 2019. A total of 350 participants were included for the study according to following inclusion and exclusion criteria. Non-probability convenient sampling was used. Data were collected from adult citizen residing in Mirpur through questionnaire by personal interview. Taking history, physical examination and medical records were checked. Collected data were analyzed by computer technology SPSS version 22.0. Descriptive statistics (mean, SD, frequency, percentage) and inferential statistics (Chi-square) were used. Permission from ethical review committee of Gono Bishwabidyalay was taken.

- Inclusion Criteria
  - Age above 25 years.
  - Willing to participate.
- Exclusion Criteria
  - Not willing to participate.

## RESULTS

Out of 350 participants, 141 (40.3%) number of participants were in 55-64 age group which was followed by 115(32.9%), 45(12.9%), 36(10.3%), 13(3.7%) of 45-54 age group, 35-44 age group, ≥65 age group and 25-34 age group respectively. Most of the male respondents (43.5%) were in 55-64 age groups, which were followed by 45-54 age groups (29.6%). On the other hand, most the female participants (39.2%) constitute 45-54 age groups and 55-64 age groups (34.2%) followed it [Table 1]. Majority of the participants were male 230(65.7%) and rests of them were female 120(34.3%) [Figure 1]. 39.7% participants completed HSC education that was followed by 31.4% participant has completed graduation

and post-graduation level education. Remaining 11.4% participants were illiterate, 10.3% participants completed SSC education and 7.1% participants completed primary education [Table 2]. Majority (31.7%) of the respondents were service holder which followed by 27.7% housewives, 24.0% business, 9.4% retired person, 4.6% day labor, 2.3% farmers and 0.3% others occupation. Among the female participants, 80.8% were housewives [Table 3]. Most of the participants (72.9%) comprises high-income group followed by middle-income group (25.4%) and low-income group (1.7%). Mean monthly family income was  $26311.4 \pm 28551.6$  [Table 4]. Ischemic stroke (76%) compared to hemorrhagic stroke (24%),  $p < 0.05$ . Duration of smoking habit have found significantly higher among the ischemic stroke (88%) compared to hemorrhagic stroke (12%),  $p < 0.05$  [Table 5]. The moderate level of physical activity level have found significantly higher among the respondents with ischemic stroke (64.9%) compared to hemorrhagic stroke (35.1%),  $p < 0.05$  [Table 6]. Body mass Index of the respondents were categories in normal (18.5-23 kg/m<sup>2</sup>) overweight (23-27.5 kg/m<sup>2</sup>) and obese ( $\geq 27.5$  kg/m<sup>2</sup>). Nearly half of the respondents were overweight (46.9%) followed by Normal (32%) and obese (21.1%). Females were comparatively higher in obese 25% and male were 19.1%. The average BMI (Mean $\pm$ SD) of the respondent was  $24.75 \pm 3.55$  [Table 7]. Among the respondents, average (Mean $\pm$ SD) systolic Blood pressure was  $146.36 \pm 11.53$  and average (Mean  $\pm$ SD) Diastolic Blood Pressure was  $97.05 \pm 9.74$ . 76.3% respondents were hypertensive (SBP  $\geq 140$ , DBP  $\geq 90$ ) and remaining was normal [Table 8]. Significant association was found between type of stroke

and blood glucose level ( $p=0.036<0.05$ ) and blood pressure ( $p=0.001<0.05$ ) [Table 9].

**Table 1:** Distribution of the age (n=350).

Variable	Male n (%)	Female n (%)
<b>Age</b>		
25-34	13 (5.7)	0 (0.0)
35-44	16 (8.3)	26 (21.7)
45-54	68 (29.6)	47 (39.2)
55-64	100 (43.5)	41 (34.2)
≥65	30 (13)	6 (5)

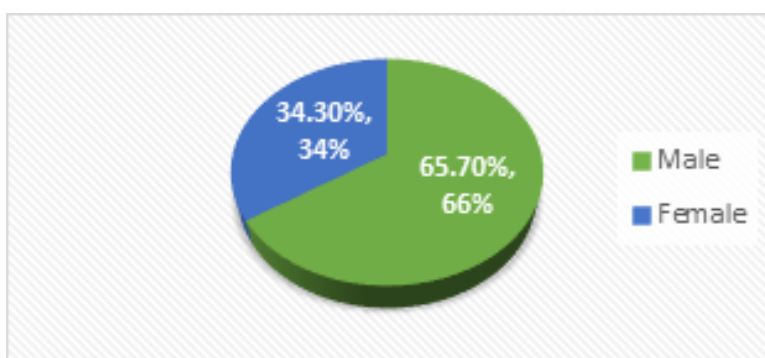


Figure 1: Gender distribution (n=350).

**Table 2:** Educational level of the respondents (n=350).

Variable	Male n (%)	Female n (%)
<b>Education</b>		
Illiterate	21 (9.0)	19 (15.8)
Primary	14 (6.1)	11 (9.2)
SSC	16 (7.0)	20 (16.7)
HSC	95 (41.3)	44 (36.7)
Graduation and above	84 (36.5)	26 (21.7)

**Table 3:** Occupational status of the respondents (n=350).

Variable	Male n (%)	Female n (%)
<b>Occupation</b>		
Housewife	0 (0.0)	97 (80.8)
Retired	31 (13.5)	21 (1.7)
Service holder	93 (40.4)	18 (15.0)
Business	81 (35.2)	3 (2.5)
Day labor	16 (7.0)	0 (0.0)
Farmer	8 (3.5)	0 (0.0)
Others	1 (0.4)	0 (0.0)



**Table 4:** Monthly income of the respondents (n=350).

Variable	Male n(%)	Female n(%)
<b>Monthly income</b>		
<5000	2 (0.9)	4 (3.3)
5000-15000	62 (27.8)	27 (22.5)
>15000	166 (72.2)	89 (74.2)
Mean	26311.4±28551.6	

**Table 5:** Association between type of stroke and smoking (n=350).

Variable	Type of stroke		Chi-square	p value
	Ischemic	Hemorrhagic		
<b>Smoking habit</b>				
Current smoker	42 (35.6)	22 (34.4)	6.734	0.034
Previous smoker	38 (76)	12 (24)		
Never smoked	135 (57.2)	101 (42.8)		
<b>Frequency of smoking</b>				
1-5 sticks	22 (71.0)	9 (29.0)	2.953	0.228
5-10 sticks	44 (65.7)	23 (34.3)		
> 10 sticks	14 (87.5)	2 (12.5)		
<b>Years of smoking</b>				
≤ 10 years	22 (88)	3 (12.0)	0.028	0.021
>10 years	58 (65.2)	31 (34.8)		
≥10 years	84 (65.1)	45 (34.9)		

**Table 6:** Association between physical activity and type of stroke (n=350).

Variable	Type of stroke		Chi-square	p value
	Ischemic	Hemorrhagic		
<b>Physical activity</b>				
Sedentary	16 (80)	4 (20.0)	8.130	0.046
Light work	61 (52.6)	55 (47.4)		
Moderate work	135 (64.9)	73 (35.1)		
Hard work	3 (50.0)	2 (50.0)		

**Table 7:** Physical findings of the respondents (n=350).

Variables	Male n (%)	Female n (%)	Both n (%)
<b>BMI category</b>			
Normal(18.5-22.99 kg/ m 2)	78 (33.9)	34 (28.3)	112 (32.0)
Overweight(23-26.99 kg/ m 2)	108 (47)	56 (46.7)	164 (46.9)
Obesity (≥ 27.0 kg/ m 2)	44 (19.1)	30 (25)	74 (21.1)
Mean ±SD	24.75±3.55		

**Table 8:** Blood pressure measurement of the respondents (n=350).

Blood Pressure			
Normal	56 (24.3)	27(22.5)	83(23.7)
Hypertensive	174(75.7)	93(77.5)	267(76.3)
SBP(Mean ±SD)	146.36±11.53		
DBP(Mean ±SD)	97.05±9.74		

**Table 9:** Association between type of stroke and glucose level and blood pressure (n=350).

Variables	Type of stroke		Chi-square value	p value
	Ischemic	Hemorrhagic		
Blood glucose level				
Normal	47(52.8)	42(47.2)	3.742	0.036
High	168(64.4)	93(35.6)		
Blood pressure				
Normal	38(45.8)	45(54.2)	11.240	0.001
Hypertensive	177(66.3)	90(33.7)		

## DISCUSSION

In this study shows that pick stroke incidence (40.3%) occurs at the 55-64 year age group and 45-54 year age group (32.9%) followed it. It estimates that almost 73% stroke occurs in age 45-64 age group in Bangladesh which affect the golden years of active population. The risk of stroke doubles for each successive decade after age 55 years.<sup>[11]</sup> The greater prevalence of stroke in men is well known.<sup>[12]</sup> In this study, 65.7% subjects were male, 34.3% were female, and ratio was M: F=1.91:1, which coincide with previous study of Hossain AM et al,<sup>[13]</sup> and Chowdhury et al.<sup>[14]</sup> However, this study shows that majority (39.7%) of the respondent's complete HSC education and graduate and postgraduate completed respondents (31.4%) followed it. The study represents only 11.4% respondents were illiterate, which coincide the study of Hossain, AM et al.<sup>[13]</sup> Occupational category of this study shows that majority (31.7%) of the population were service holders in which male

subjects (40.4%) were preponderance. The second highest occupation category comprises homemakers (27.7%) in which 80.8% were only female subjects. Third highest categories of occupation comprise business (24%) which also shows male preponderance (35.2%). Finding of this study was coinciding with Hossain et al,<sup>[13]</sup> which also shows service holder preponderance (28%). Our study shows that most of the subjects (72.9%) comprises upper middle-income group (≥15000 TK/month) and the mean income was 26311.4±28551.6. This study coincides with the study of Chapman et al,<sup>[15]</sup> which showed the incidence of stroke was high among the high-income group. Findings of this study may reflect the recent trend of socioeconomic status of Bangladesh. Data of this study presents that, 67.4% participants never smoked directly, on the other hand, 18.3% were current smoker and 14.3% participants were previous smoker. These findings contradict with the previous study of Hossain AM et al,<sup>[13]</sup> (53.53% smoker).

This study has found that previous smoking habit and smoking habit for more than ten year was significantly higher in ischemic group. In this study, 59.4% subjects were habituated to moderate work but 94.3% respondents were not habituated to any form of physical exercise prior to stroke. These findings contradict with the findings of Marmot MG and Poulter NR.<sup>[16]</sup> A study presents that majority of the study subjects were overweight (46.9%) followed by normal BMI (32%) and obese 21.1%. These findings contradict with the findings of Sacco RL et al.<sup>[17]</sup> In obese category, female (25%) were more preponderance compared to male respondents (19%). The mean BMI of the subjects was  $24.75 \pm 3.55$ . From the hospital records of the subjects it shows that, most respondents were hypertensive (76.3%) with mean Systolic BP  $146.36 \pm 11.53$  and mean Diastolic BP  $97.05 \pm 9.74$ . It is generally accepted, that hypertension is the most important modifiable risk factor for stroke and has the highest population-attributable risk for stroke.<sup>[18]</sup> Findings of this study (76.3% hypertensive) was higher from the findings of Hossain AM et al (63%).<sup>[13]</sup> High Blood glucose level have found significantly higher among the ischemic stroke (64.4%) compared to hemorrhagic stroke (35.6%),  $p=0.001$ . Present study showed that 53.7% respondents were diabetic and among the diabetic patients, 67% suffered from 1-10 year and remaining suffered from diabetes for more than 10 years. The present study showed that 75.4% of the stroke patients were suffering from hypertension. 81.8% subjects were suffering from HTN for last 1-10 years among the hypertensive patients.

### Limitations of the study

Purposive sampling was used which is not a representative sampling procedure. Findings of this study may not be represents the stroke status of adult population of the whole Bangladesh as it was conducted only in Mirpur.

### CONCLUSIONS

Almost all study in Bangladesh showed that stroke affects mainly illiterate people but in this study find out that stroke occurs majority in literate person who completed HSC level of education and above. This study also finds that stroke incidence is more in high-income group in Bangladesh, which is, clearly differ from the previous trend, which observed stroke is more prevalent low-income group. This study also focus on some major modifiable lifestyle and behavioral pattern of Bangladeshi population such as smoking habit of male, unhealthy diet practice, low level of physical activity. Stroke is more preventable than to cure. Meticulous control of risk factors (prohibition of smoking control of DM, HTN & dyslipidemia), Modification of life styles (adequate physical exercise, avoidance of excessive fat intake, avoidance of excessive wordiness & anxiety). Stroke awareness program should be conducted at various levels by using mass media. Evidence-based public health education about stroke warning symptoms, risk factors, morbidity, mortality, and importance of time window for acute treatment. Capacity building to provide sufficient resources for above education and delivery of stroke-related education.

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Source of Support: Nil, Conflict of Interest: None declared