

Risk factors of stroke: A cross cut survey study on the basis of social class

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Abstract

Stroke is the second leading cause of death worldwide and the leading cause of long-term disability. A worldwide study based on vital record and data imputation shows that per year 15 million people faces the event 'stroke' which causes 5 million deaths and a further 5 million patients living with permanent cognitive and physical disability. The aim of this study was to assess risk factors of stroke among different socio-economic group in Bangladesh. Methods: This was a cross sectional descriptive study with a sample size of 350. The samples were selected purposively on the basis of inclusion and exclusion criteria. A pretested semi structured questionnaire was used to collect data and consent was taken prior interview. SPSS version 22.0 was used to analyze data. Most of the male respondents (43.5%) were in 55–64 age groups and female participants (39.2%) constitute 45–54 age groups. Nearly half of the respondents were overweight (46.9%) followed by normal (32%) and obese (21.1%). About 76.3% respondents were hypertensive (SBP ≥ 140 , DBP ≥ 90) and remaining was normal. Result shows that previous smoking habit have found significantly higher among the respondents with ischemic stroke (76%) compared to hemorrhagic stroke (24%), $p < 0.05$. History of hypertension has been found significantly higher among the respondents with ischemic stroke (65.9%) compared to hemorrhagic stroke (34.1%), $p < 0.05$. High prevalence of hypertension, diabetes mellitus, ischemic heart disease, and dyslipidemia among the stroke patients were found.

Keywords: Risk Factors, Stroke, Social Class

Introduction

Today, there is a wealth of information available on the cause, prevention, and treatment of stroke. But there is scarcity of information on risk factors among different social classes. Economic burden of stroke is in need of more attention for more effective health care planning and resources allocation. The gap in knowledge on stroke epidemiology between developed and developing countries is widening. Despite apparent differences in the risk factors of stroke between various income groups, most occurrences of stroke can be attributed to conventional risk factors. There is a lack of reliable and comparable data on stroke incidence in developing countries. 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. Bangladeshis lie in their heavier burden of some established risk factors, their socioeconomic deprivation, and some novel risk factors that are yet to be characterized. 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 among separate income groups is vital. 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 (US Census Bureau, 2010). For women, the burden from these risk factors is also high, except for smoking, which is uncommon [1]. A population-based case-control study of 1,250 stroke deaths in rural Bangladesh present that risk of stroke death has significantly increased with hypertension, diabetes mellitus, betel consumption when adjusted for age and sex [2]. Bhopal *et al.* [1] 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. Betel consumption may be an under-recognized risk factor for stroke death [3].

Methods

This was cross-sectional analytical study, conducted in Mirpur of Dhaka city. This area was selected for data collection and get adequate sample for this study. Non-probability convenient sampling was used to collect study subjects. Data were collected from adult citizen residing in Mirpur in March 2019 through questionnaire by personal interview. Face to face interview was carried out. Taking history, physical examination, and medical records were checked if available. After administering questionnaire, data were checked for consistency. Individual sheet was checked and cleaned to avoid any error. Data were categorized and coded during entry into the SPSS software. Collected data were analyzed by computer technology SPSS version 22.0. Collected information was presented in the form of tables and graphs.

Results

Age group distribution of the participants shows that 141 (40.3%) 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 of the female participants (39.2%) constitute 45–54 age group followed by 55–64 age group (34.2%). About 5.7% male participants were in 25–34 age groups whereas there were no female participants in this young age group. Among the male participants 13% was in ≥65 year's age group whereas only 5% female participants were in this age group.

Education levels of the respondents were classified in five groups. Among the groups 39.7% participants completed HSC education that was followed by 31.4% participant's 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.

Occupational distribution of the participants shows that majority (31.7%) of the respondents were service holder, which was 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.

Monthly income of the participants family were categories in three group, namely low income group (≤5000 TK), middle income group (5,000–15,000 TK.) and high income group (≥15,000 TK.). 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 26,311.4±28,551.6.

Table 1. Distribution of the age.

Variable	Male n (%)	Female n (%)
Age		
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)

Table 2. Educational level of the respondents.

Variable	Male n (%)	Female n (%)
Education		
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.

Variable	Male n (%)	Female n (%)
Occupation		
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)

Within the study subjects, 67.4% of participants never smoke directly, on the other hand 18.3% were current smokers, and 14.3% participants were previous smokers. Among the male participants 27.8% were current smokers and 21.7% were previous smokers. All female participants of this study had no smoking habit.

Within smoker respondents, 58.8% were moderate (5-10 sticks/day) smokers, 27.2% light smokers (1-5 sticks/day) and 14% were heavy smokers (≥ 10 sticks/day). Average (Mean \pm SD) number of sticks used by the smokers was 7.46 \pm 3.43.

About 78.1% smokers smoked for more than 10 years while 21.9% smoker smoked for less than 10 years and mean duration of smoking habit was 17.13 \pm 6.94 years.

Data related to alcohol consumption shows that most of the respondents (86.6%) never consumed alcohol, 12.6% of respondents previously consumed alcohol and 0.9% consumers currently consume alcohol.

Among the study subjects, physical activity data shows that 59.4% of subjects were moderate workers, 33.1% were light workers, 5.7% were sedentary workers, and 1.7% hard workers.

Table 10 presents characteristics of some physical and biochemical parameters of the respondents based on the hospital records of the study subjects. Body mass index of the respondents was as follows, normal category (18.5–23 kg/m²), overweight (23–27.5 kg/m²), and obese (≥ 27.5 kg/m²). Nearly half of the respondents

Table 4. Monthly income of the respondents.

Variable	Male n (%)	Female n (%)
Monthly income		
<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 \pm 28551.6	

Table 5. Smoking habit of the respondents.

Variable	Male n (%)	Female n (%)	Both n (%)
Smoking habit			
Current smoker	64 (27.8)	0 (0.0)	64 (18.3)
Previous smoker	50 (21.7)	0 (0.0)	50 (14.3)
Never smoked	116 (50.4)	120 (100)	236 (67.4)

Table 6. Smoking rate of the respondents.

Smoking rate	Male n (%)	Female n (%)	Both n (%)
1–5 sticks	31 (27.2)	0 (0.0)	31 (27.2)
5–10 sticks	67 (58.8)	0 (0.0)	67 (58.8)
≥ 10 sticks	16 (14)	0 (0.0)	16 (14.0)
Mean \pm SD	7.46 \pm 3.43		

Table 7. Years of smoking of the respondents.

Years of smoking	Male n (%)	Female n (%)	Both n (%)
≤ 10 years	25 (21.9)	0 (0.0)	25 (21.9)
>10 years	89 (78.1)	0 (0.0)	89 (78.1)
Mean \pm SD	17.13 \pm 6.94		

Table 8. Alcohol consumption behavior.

Variable	Male n (%)	Female n (%)	Both n (%)
Alcohol			
Current consumer	2 (0.9)	1 (0.8)	3 (0.9)
Previous consumer	32 (14.8)	12 (10)	44 (12.6)
Never consumed	196 (85.2)	107 (89.2)	303 (86.6)

Table 9. Physical activity level of the respondents.

Variables	Male n (%)	Female n (%)	Both n (%)
Physical activity			
Sedentary	11 (4.8)	9 (7.5)	20 (5.7)
Light work	74 (32.2)	42 (35)	116 (33.1)
Moderate work	143 (62.2)	65 (54.2)	208 (59.4)
Hard work	2 (0.9)	4 (3.3)	6 (1.7)

Table 10. Physical findings of the respondents.

Variables	Male n (%)	Female n (%)	Both n (%)
BMI category			
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 \pm SD	24.75 \pm 3.55		

Table 11. Blood pressure measurement of the respondents.

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

were overweight (46.9%) followed by Normal (32%) and obese (21.1%). Females are comparatively higher in obese (25%) among the female respondents than the males (19.1%). The average BMI of the respondent was 24.75 \pm 3.55.

Among the respondents, average systolic blood pressure was 146.36 \pm 11.53 and average diastolic blood pressure was 97.05 \pm 9.74. 76.3% of respondents were hypertensive (SBP \geq 140, DBP \geq 90) and remaining was normal.

Discussion

The aim of this study was to identify the common risk factors of stroke among the Bangladeshi people and pay attention on it. This study may not have reflected the exact situation but gives an utmost picture of the disease. Several important pieces of information about the risk factors of stroke have been found in this study. There is a clear change in the previous trend of socio-demographic characteristics of the stroke patients in this study. Most of the stroke incidence occurred in 45–64 years of age and its estimate is nearly 73% of the total subjects which is different from the developed countries. So, it needs a clear attention about the age onset of stroke to reduce the stroke burden in Bangladesh. The study finds out the urban residence preponderance on stroke occurrence. This study also finds a new trend in relation to education level. Almost all studies in Bangladesh showed that stroke affects mainly illiterate people but, in this study, it was found out that stroke occurs majorly in literate persons who completed HSC level of education and above. This study also found that stroke incidence is more in high income group in Bangladesh which is clearly different from the previous trend which observed stroke is more prevalent in low income group. There are many risk factors for stroke, some are modifiable and some are non-modifiable. This study also focused 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. In an under developing country like ours, the best policy for combating stroke is primary prevention. Age is the single most important risk factor for stroke. Frequency of stroke rises exponentially with increasing age. The risk of stroke doubles for each successive decade after the age of 55 years [4]. It is estimated that almost 73% of stroke cases occurs in 45–64 age group in Bangladesh which affect the golden years of active population. This study slightly differs from the study by Bushnell [5], in which the mean age of the stroke patients was

60.0 \pm 13.7 years. According to Ferri *et al.* [6] stroke prevalence is inversely proportional to the education levels of stroke survivors. But this study shows that majority (39.7%) of the respondent's complete HSC education and it was followed by graduate and postgraduate respondents (31.4%). The study represents only 11.4% respondents who were illiterate which coincides with the study by Hossain *et al.* [7] and 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 housewives (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%). Findings of this study coincided with Hossain *et al.* [7], which also shows service holder preponderance (28%). This study showed that among the affected people, 89% were working force of our society, which indicates a serious impact on the families of the sufferers. Our study shows that most of the subjects (72.9%) comprises upper middle income group (\geq 15000 TK/month) and the mean income was 26311.4 \pm 28551.6. This study coincides with the study by Chapman *et al.* [8] which showed the incidence of stroke was high among the high-income group. But this study differs from the findings of Hossain *et al.* [7] which shows the low-income group (monthly income TK<5000) comprised the majority (47%). These results also differ with the study by Hart *et al.* [9] which concluded that poor socio-economic circumstances were associated with greater risk of stroke. Findings of this study may reflect the recent trend of socioeconomic status of Bangladesh. Data of this study presents that 67.4% of participants never smoked directly, on the other hand 18.3% were current smokers and 14.3% participants were previous smokers. These findings contradict with the previous study by Hossain *et al.* [7] (53.53% smoker). This study has found that previous smoking habit and smoking habit for more than ten years was significantly higher in ischemic group. A meta-analysis of 7 trials has found an inverse association between fruit intake and stroke occurrence. Hence increasing fruit and vegetable consumption (for each 1-serving per day) is considered to reduce the risk of stroke by 6%. This study found that most of the participants (42.3%) consume only 1 serving of fruit and vegetables with a mean of 1.76 \pm 0.741 servings of the total respondents. In this study 59.4% of subjects were habituated to moderate work but 94.3% respondents were not habituated to any form of physical exercise prior to stroke. In obese category, females (25%) were more preponderance compared to male

respondents (19%). The mean BMI of the subjects was 24.75 ± 3.55 . From the hospital records of the subjects, it was evident that most respondents were hypertensive (76.3%) with mean Systolic BP 146.36 ± 11.53 and mean Diastolic BP 97.05 ± 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. Findings of this study show that 76.3% were hypertensive, which was higher than the findings of Hossain *et al.* [7] (63%). The present study showed that 75.4% of the stroke patients were suffering from hypertension, 81.8% subjects were suffering hypertension for last 1-10 years among the hypertensive patients.

Conclusion

This study reveals that some major modifiable risk factors such as hypertension, smoking, unhealthy diet, physical inactivity which need maximum attention for the prevention of stroke. Identification of risk factors is the only way to achieve this goal. Implementation of screening programs in the community to identify risk factors and educate people about primary prevention should be initiated in this regard. This way, we can reduce morbidity and mortality among stroke patients and alleviate the burden of stroke.

References

1. Bhopal R, Unwin N, White M, Yallop J, Walker L, Alberti KG, et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross sectional study. *BMJ*. 1999 Jul 24;319(7204):215–20.
2. Mateen FJ, Carone M, Alam N, Streatfield PK, Black RE. A population-based case-control study of 1250 stroke deaths in rural Bangladesh. *Eur J Neurol*. 2012 Jul;19(7):999–1006.
3. Bhopal R, Rahemtulla T, Sheikh A. Persistent high stroke mortality in Bangladeshi populations. *BMJ*. 2005 Nov 12;331(7525):1096–7.
4. Brown RD, Whisnant JP, Sicks JD, O'Fallon WM, Wiebers DO. Stroke incidence, prevalence, and survival: secular trends in Rochester, Minnesota, through 1989. *Stroke*. 1996 Mar;27(3):373–80.
5. Bushnell CD. Stroke and the female brain. *Nat Clin Pract Neurol*. 2008 Jan;4(1):22–33.
6. Ferri CP, Acosta D, Guerra M, Huang Y, Llibre-Rodriguez JJ, Salas A, et al. Socioeconomic factors and all cause and cause-specific mortality among older people in Latin America, India, and China: a population-based cohort study. *PLoS Med*. 2012 Feb;9(2):e1001179.
7. Hossain AM, Ahmed NU, Rahman M, Islam MR, Sadhya G, Fatema K. Analysis of sociodemographic and clinical factors associated with hospitalized stroke patients of Bangladesh. *Faridpur Medical College Journal*. 2011;6(1):19–23.
8. Chapman JM, Reeder LG, Borun ER, Clark VA, Coulson AH. Epidemiology of vascular lesions affecting the central nervous system: the occurrence of strokes in a sample population under observation for cardiovascular disease. *Am J Public Health Nations Health*. 1966 Feb;56(2):191–201.
9. Hart CL, Hole DJ, Smith GD. Influence of socioeconomic circumstances in early and later life on stroke risk among men in a Scottish cohort study. *Stroke*. 2000 Sep;31(9):2093–7.