

## Smoking and Ischemic Stroke

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### Abstracts:

*This case control observational study was conducted in Neurology Department of Dhaka Medical College Hospital (DMCH) to determine the relation of smoking with ischemic stroke. Fifty cases & 50 controls were selected following certain inclusion & exclusion criteria. The results of the study showed that mean age of ischemic stroke was  $63.58 \pm 10.22$  years. Ischemic stroke was more common in male ( $M:F=2.57:1$ ). Majority of the ischemic stroke came from middle class economic condition. Habit of smoking was equally present in case & control groups (54% & 52%) respectively. However duration of smoking was significantly longer ( $P < 0.01$ ) in ischemic stroke patients ( $35.26 \pm 9.97$  yrs.) than the control group ( $24.12 \pm 7.32$  yrs.). The number of cigarette sticks taken per day was  $15 \pm 1.2$  in stroke patients and  $6 \pm 1.5$  per day in the control group with a significant difference between them ( $P < 0.01$ ). Longer duration & increased number of cigarette sticks smoking were significantly associated with ischemic stroke ( $P < 0.01$  &  $P < 0.01$ ).*

### Introduction:

Stroke is one of the common causes of death in the developed countries. It is also an important cause of mortality and

morbidity in our country. Stroke has been defined as focal, at times global, neurological deficit of sudden onset lasting for more than 24 hours or leading to death of the patient with no apparent cause other than that of vascular origin<sup>1</sup>. Stroke has modifiable risk factors like hypertension, diabetes mellitus, dyslipidemia, obesity & smoking<sup>2</sup>. Successful modification of these risk factors may play important role in primary or secondary prevention of stroke. Smoking is a common personal habit among Bangladeshi people. It is an important cause of atherosclerosis<sup>3</sup>. The present study was conducted to see the prevalence of smoking & its role in ischemic stroke patients.

### Methods & Materials:

The study was a case control study conducted in the Neurology department of DMCH from January 2005 to March 2006. Cases were ischemic stroke patients admitted in Medicine & Neurology departments of DMCH proved by computerized tomography (CT) scan of brain. Controls were age & sex matched healthy volunteers from the community. Fifty cases & 50 controls were selected randomly following inclusion & exclusion criteria.

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**Inclusion criteria:** Age above 40 years, first attack of stroke, patients admitted within 7 days of onset of illness & those who or their legal attendant gave consent to be included in the study.

**Exclusion criteria:** Age below 40 years, focal neurological deficit due to other causes like vasculitis, infection & intracranial space occupying lesion (ICSOL), those who did not give consent.

The variables included in the study were age, sex, economic status, presence of smoking habit, duration of smoking & amount of smoking per day. Detailed history

taking and clinical examination were done. Some relevant investigations were done. Data were analyzed with the help of computer using SPSS (Statistical package for social science). Statistical significance was set at 0.05 level & confidence interval at 95%.

**Results:**

The mean age of ischemic stroke was 63.58 ± 10.22 years (Table-I). Majority (80%) of the patients belonged to the age group 50 to 79 years (Table-II). Seventy two percent of the ischemic stroke patients were male & 28% female. Most of the patients (80%)

**Table - I**  
*Comparison of age between case and control groups.*

Age	Group		T value	df	P value
	Case (n-50)	Control (n-50)			
40-49	46.33 ± 1.53	44.33 ± 1.16	0.226	98	0.822
50-59	54.60 ± 2.85	53.87 ± 2.59			
60-69	62.73 ± 3.06	61.13 ± 1.60			
70-79	71.50 ± 2.42	72.50 ± 2.72			
80-89	80.71 ± 1.89	81.71 ± 2.36			
Mean	63.58 ± 10.22	63.10 ± 11.01			

The mean age of ischemic stroke patients was 63.58 ± 10.22 years.

**Table - II**  
*Age and sex distribution between case and control groups*

Age in Years	Study group			
	Case		Control	
	Male	Female	Male	Female
40-49	2 (4)	1 (2)	2 (4)	1 (2)
50-59	12 (24)	3 (6)	12 (24)	3 (6)
60-69	8 (16)	7 (14)	8 (16)	7 (14)
70-79	8 (16)	2 (4)	8 (16)	2 (4)
80-89	6 (12)	1 (2)	6 (12)	1 (2)
Total	36 (72)	14 (28)	36 (72)	14 (28)

Seventy two percent of the stroke patients were male and 28% female. Eighty percent of the stroke patients belonged to age groups of 50-79 years.

came from middle class income group (Table-III). Fifty four percent of the cases and 52% of the controls were smoker (Table- IV). Mean duration of smoking in

the case and control groups was  $35.26 \pm 9.9$  years and  $24.12 \pm 7.32$  years (Table-V) respectively. The average number of sticks taken per day was  $15 \pm 1.2$  in case group and  $6 \pm 1.5$  in the control group.

**Table-III**  
*Economic condition of cases and controls*

Economic Status	Case (n-50)	Control (n-50)	$\chi^2$ value	Df	P value
Upper	6 (12)	4 (8)	1.785	2	0.410
Middle	40 (80)	38 (76)			
Lower	4 (8)	8 (16)			
Total	50 (100)	50 (100)			

Most of the patients (80%) of ischemic stroke came from middle class economic condition while 12% were of upper and 8% lower economic condition.

**Table-IV**  
*Comparison of smoking habit between case and control groups*

Study groups	Smoking habit		Total	$\chi^2$ value	df	P value
	Smoker	Non- smoker				
Case (n - 50)	27 (54)	23 (46)	50 (100)	0.04	1	0.841
Control (n - 50)	26 (52)	24 (48)	50 (100)			
Total	53 (53)	47 (47)	100(100)			

Fifty four percent of ischemic stroke patients and 52% of the controls were smoker. There was no significant difference between the two groups regarding the presence of smoking habit ( $p>0.05$ ).

**Table-V**  
*Comparison of smoking duration between case and control groups.*

Groups	Mean duration of smoking in years.	t value	df	p value
Case (n = 27)	$35.26 \pm 9.97$	4.623	51	0.001
Control (n = 26)	$24.12 \pm 7.32$			

Mean duration of smoking in the case and control groups was  $35.26 \pm 9.9$  years and  $24.12 \pm 7.32$  years respectively. There was significant difference between the two groups regarding the duration of smoking habit ( $P < 0.01$ ).

**Table-VI***Comparison of daily number of sticks smoked between case and control groups.*

Groups	Mean number of sticks of cigarette smoked per day.	t value	df	p value
Case (n = 27)	15 ± 1.2	24.17	51	0.001
Control (n = 26)	06 ± 1.5			

The average number of sticks of cigarette smoked per day was 15 ± 1.2 in case group and 6 ± 1.5 in the control group.

**Discussion:**

Smoking has been found to be a risk factor for ischemic stroke<sup>4</sup>. It is also a risk factor for chronic obstructive airway disease, lung cancer, carcinoma esophagus, coronary heart disease and peripheral vascular disease<sup>5</sup>. This study was conducted to see the smoking habit of patients with ischemic stroke & to find any association of smoking with ischemic stroke. The results showed that the mean age of stroke patients was 63.10 ± 11.0 years. Previous two studies<sup>4,6</sup> showed mean age 55.56 ± 13.14 years and 59.61 ± 13.20 years. Most patients in this study belonged to the age group of 5<sup>th</sup> & 6<sup>th</sup> decade (60%). The mean age of ischemic stroke in this study is higher than previous studies. The mean age of ischemic stroke is increasing in our country due to increased life expectancy because of improvement in education, public awareness & improved health care facilities. Male: female ratio of ischemic stroke patients in this study was 2.57:1 indicating that ischemic stroke is a male predominant disease. The male: female ratio in previous studies<sup>6,7</sup> was higher 8.9:1.1 & 8.56:1.44. The cause of higher prevalence in male in addition to other factors may be that female patients with ischemic stroke get less admitted in hospitals due to religious ground & less

attention by the family. Eighty percent of ischemic stroke patients in this study came from middle class economic condition. This result does mean that ischemic stroke is more common in middle class people. This hospital based study may not reflect association of economic status with ischemic stroke. Patients of ischemic stroke with higher economic status usually seek health service in private hospital or clinics on payment in a better environment while poor people avail government health care facilities free of cost. Previous hospital based studies<sup>6,7</sup> showed that 57% & 61% patients of ischemic stroke came from middle class economic condition. The present case –control study revealed that 54% of cases & 52% of controls were smoker indicating that smoking is a common habit in Bangladeshi people. Mere presence of smoking habit showed no significant association with ischemic stroke ( $p > 0.05$ ). However duration of smoking & amount of smoking showed significant relation. The mean duration of smoking in ischemic stroke patients was 35.26 ± 9.97 years which was longer than the control group (24.12 ± 7.32 years). Longer duration of smoking showed significant association with ischemic stroke ( $p < 0.01$ ). It may be that prolonged & heavy smoking have cumulative effect in causing atherosclerosis

& ischemic stroke. Chronic smoking increases fibrinogen, platelet adhesiveness & increases blood viscosity and reduces blood flow contributing to pathogenesis of ischemic stroke<sup>8</sup>. The number of cigarette sticks smoked per day in the case group was  $15 \pm 1.2$  while it was  $6 \pm 1.5$  per day in the control group. There was significant difference between the two groups regarding the amount of smoking per day ( $P < 0.01$ ). Previous long term prospective study revealed that daily cigarette smoking increases the risk of fatal stroke three & half times<sup>9</sup>. An increased risk was found in relation to increased consumption<sup>9</sup>. Other study supported this finding<sup>10</sup>. The relative risk of stroke in a heavy smoker ( $>40$  cigarette/day) was twice than that of light smoker ( $<10$  cigarette/day). The stroke risk reduced significantly by two years after cessation of smoking & was at the level of non-smoker by 5 years of cessation of smoking<sup>10</sup>.

#### References

1. Hantano S. Experience from a multicentre stroke register. *B11 WHO*, 1976; 54: 61-33.
2. Allen CMC, Lueck CJ, Dennis MS. Neurological disease. In: Boon NA, colledge NR, Walker BR, Hunter JAA, editors. *Davidson's Principles & practice of medicine*; 20<sup>th</sup> edition: Churchill Living Stone. Elsevier, Edinburg; 2005:1200-02.
3. Frederick JS. Blood vessels. In: kumar V, Abbas AK, Fausto N. Robin and Cotran pathologic basis of disease. 7<sup>th</sup> edition, Elsevier, Philadelphia; 2004, pp. 511-25.
4. Khan MRK. Relationship between Blood lipids, lipoprotein and ischemic stroke (Thesis), BSMMU, Dhaka, Jan. 2000.
5. Kumar P, Clark M. Respiratory disease. In: Kumar & Clark *Clinical Medicine*. 5<sup>th</sup> edition. WB Saunders, London; 2002, pp. 850-60.
6. Alam B, Habib H, Qurashi FA, Badrul H, Haque A, Mohammed QD. Stroke-Evaluation of risk factors. *Bangladesh Journal of Neuroscience*. 1999; 15(1/2):14-18.
7. Bhuiyan MM, Rahman HZ, Islam MR, Ullah AKMA, Haque AKMA. Four years evaluation of stroke patients in stroke clinic. *Bangladesh Journal of Neuroscience*; 2004; 20(2): 50-55.
8. Sacco RL, Benjmin EJ, Broderick JP, Dyken Mark, Easton JD, Feinberj. Risk factors of stroke. *Stroke* 1997; 28: 1507-17.
9. Haheim LL, Holme I, Jermann IH, Leren P. Smoking habit & risk of fatal stroke. Eighteen years follow up of the Oslo study. *J Epidemiol Community Health*; 1996; 50 (6): 621-24.
10. Wolf PA, Agostino RBD, Kannel WB, Bonita R, Belanger AJ. Cigarette smoking as a risk factor for stroke-The Framingham study; *JAMA*: 1998; 259 (7): 961-65.