

# Association of Hypertension and Smoking with Ischaemic Stroke

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## ABSTRACT

Hypertension is one of the most important modifiable risk factors for ischemic stroke. Cigarette smoking is a risk factor for atherosclerotic disease. There is a strong relationship between hypertension and cigarette smoking with ischaemic stroke. A case control study was undertaken to see the association of hypertension and cigarette smoking with ischaemic stroke. The study was done from January to December 2009 in the Department of Biochemistry, Dhaka Medical College, Dhaka. A total of 60 subjects were selected as study population. Among them 30 were diagnosed case of ischaemic stroke and 30 were age-and sex-matched control subjects. It was found that 60% patients of case group and 20% respondents of control group were hypertensive and difference was significant. Study showed that 56.66% of cases and 53.33% of controls were smoker and the findings were insignificant. The mean duration of smoking was  $27.41 \pm 2.98$  years in cases and  $15.63 \pm 2.85$  years in controls which was significant. The study suggests that hypertension is significantly associated with ischaemic stroke and longer duration of smoking also associated with ischaemic stroke.

**Key Words:** Ischaemic Stroke, Cigarette Smoking, Hypertension

## Introduction

After coronary artery disease and cancer, stroke is the third commonest cause of death in the developed countries<sup>1</sup>. It predominates in the middle and late years of life. Traditional risk factors for stroke include advanced age, hypertension, diabetes mellitus, heart disease, elevated serum cholesterol, obesity, cigarette smoking, lower socioeconomic class and drugs use and abuse<sup>2,3</sup>. Hypertension is one of the most important modifiable risk factors for ischaemic stroke. Hypertension indicates a risk of stroke when hypertension is defined as systolic blood pressure  $\geq 160$  mm Hg and / or diastolic blood pressure  $\geq 95$  mm Hg<sup>4</sup>. Cigarette smoking increases the risk of ischaemic stroke nearly two times; with a clear dose-response relation. Risk of ischemic stroke is more in the current smoker than the ex-smoker. The mechanism by which smoking is thought to

increase the likelihood of ischaemic stroke include increased fibrinogen level and platelet adhesiveness and reduced cerebral blood flow mainly due to atheroma formation and higher blood viscosity in chronic smoker<sup>5</sup>. The present study was carried out to see the association of hypertension and cigarette smoking with the ischemic stroke.

## Subjects and Method

The study was carried out in the Department of Biochemistry, Dhaka Medical College, Dhaka during the period of January to December 2009. The patients were taken from the Department of Neurology and Medicine Unit of Dhaka Medical College Hospital (DMCH). Ischaemic stroke patients were considered as case and the control were age-and sex-matched volunteers. Cases were the patients clinically suffered from ischaemic stroke confirmed by computerised (CT) tomography scan of brain attending the

Department of Neurology and different Medicine Units of DMCH during the study period. In this study sample size were taken as 60. Thirty patients with ischaemic stroke were taken as cases among which 21 were male and 9 were female; and 30 healthy volunteers were taken as controls among which 21 were male and 9 were female. Data were analyzed by computer with the help of SPSS version 12 software package. All data were recorded systematically in a data collection sheet. Categorical variables were analyzed by using chi square test. For all the statistical analysis 2-tailed 'p' values < 0.05 were considered as significant.

## Results

In both groups (case and control), 30 % were in 5<sup>th</sup> decade, 56.66 % were in 6<sup>th</sup> and 7<sup>th</sup> decade and 13.33 % were in 8<sup>th</sup> decade of their lives. In the case group Mean ( $\pm$  SD) of ages was 65.26 ( $\pm$  6.68) years and in the control group it was 65.10 ( $\pm$ 7.04) years. (Table-I).

**Table I :** Age distribution of case and control

Age (years) (n = 30) number (%)	Group-I number (%)	Group II (n = 30) number (%)
< 60	9 (30.0) *	9 (30.0)
60-80	17 (56.66)	17 (56.66)
> 80	4 (13.33)	4 (13.33)
Mean $\pm$ SD	65.26 $\pm$ 6.68	65.10 $\pm$ 7.04

Group-I = Case , Group-II = Control

\* Figures in the parentheses denote corresponding %

In this study 60% patients of case group and 20% respondents of control group were hypertensive. Statistically significant difference was observed between the two groups regarding the presence of hypertension (p= 0.004) (Table-II).

**Table II :** Association of hypertension with ischaemic stroke and control groups

Study group	Number of Hypertensive subjects	Number of non hypertensive subjects	Total	t value	p value
Case	18 (60) *	12 (40)	30(100)	8.297	0.004
Control	23 (80)	7 (20)	30(100)		
Total	35(58.33)	25(41.66)	60(100)		

\* Figures in the parentheses denote corresponding %

The study showed that 17 (56.66%) of cases and 16 (53.33%) of controls were smokers. No statistically significant difference was observed between cases and controls regarding the habit of smoking (Table-III).

The mean duration of smoking was 27.41  $\pm$  2.98 years in cases and 15.63  $\pm$  2.85 years in controls. There was significant difference between the two groups regarding the duration of smoking (Table-IV).

**Table III:** Comparison of smoking habit between case and control groups

Study group	Number of Smoker	Number of non Smoker	Total	t Value	p Value
Case	17 (56.66) *	13 (43.34)	30(100)	0.067	0.795
Control	16 (53.33)	14 (46.67)	30(100)		
Total	33(55.00)	27(45.00)	60(100)		

\* Figures in the parentheses denote corresponding %

**Table IV:** Comparison of smoking duration between case and control

Group	Mean duration of Smoking in years	t value	p value
Case (n= 17)	27.41 $\pm$ 2.98*	11.599	0.0001
Control (n= 16)	15.63 $\pm$ 2.85		

\* Unpaired 't' test was done to test significance; level of significance was 0.05

## Discussion

Hypertension is one of the most important modifiable risk factors for ischemic stroke. Most estimates for hypertension indicate a relative risk of stroke is approximately 4<sup>4</sup>. In the present study, 60 % of patients with ischemic stroke and 20% of the control were hypertensive. There was highly significant difference between the two groups regarding the presence of hypertension (p< 0.01). Goldstein et al. (2001) found similar results in their study done in USA. They estimated 50 % of patients with ischemic stroke had hypertension. The present study, showed that 56.66% of cases and 53.33% of controls were smoker. No statistically significant difference was observed between cases and controls regarding the habit of smoking

(p value > 0.50). But there was difference between the two groups regarding the duration of smoking. The mean duration of smoking was  $27.41 \pm 2.98$  years in cases and  $15.63 \pm 2.85$  years in control group which is statistically highly significant ( $p = 0.0001$ ). Longer duration of smoking was associated with ischaemic stroke. Sacco et al. (1997) in their study found cigarette smoking increases the relative risk (RR) of ischemic stroke nearly two times; with a clear dose-response relation. Another study done by Rohr et al. (1996) in USA found that longer duration of cigarette smoking had the population attributable risk percent (95 % CI intervals) for stroke among the white men was 22.6% and in the black men was 40.5% (Rohr et al 1996).

#### Conclusion

Analytical results of this study reveals that the patients of ischaemic stroke have been found to have close association with hypertension and cigarette smoking. This study suggests that hypertensive patients need measurement of blood pressure at regular interval to prevent ischaemic stroke by controlling blood pressure and give up of smoking habit.

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