

Comparing Blood Pressure and Blood Sugar Level among the Patients with Ischemic Stroke

Shailendra Singh¹, Dileep Dandotiya², Hritu Singh³, Shahid Abbas⁴

¹Senior Resident, Medicine, Atal Bihari Vajpayee Government Medical College, Vidisha, Madhya Pradesh, India

²Junior Resident, PMS, Atal Bihari Vajpayee Government Medical College, Vidisha, Madhya Pradesh, India

³Associate Professor, Psychiatry, RKDF Medical College, Bhopal, Madhya Pradesh, India

⁴Professor, MD Medicine, Sri Aurobindo Institute of Medical Sciences & PGI, Indore, Madhya Pradesh, India

Corresponding Author: Shailendra Singh

ABSTRACT

Background: Mortality and morbidity is higher among the patients with high blood sugar level and high blood pressure. Understanding the association with the stroke patients will give a clue to decrease the mortality and morbidity.

Aims and Objective: to study the effects of higher blood pressure and blood sugar levels in patients with stroke.

Materials and Methods: Ninety subject were studied in the Department of General Medicine at Sri Aurobindo Medical College and PGI, Indore (M. P.) for one and half year from June-2015 to March-2016 after dividing them in to Cases (n=45; patients with stroke) and Control (n=45; subjects without stroke). Both systolic blood pressure and diastolic blood pressure and fasting and post prandial blood sugar levels were measured for all the subjects.

Results: Mean fasting blood sugar of cases (83.98±8.68 mmol/L) was little lower than control (87.02±7.32 mmol/L) (p>0.05). Mean post prandial blood sugar of cases (122.29±46.37 mmol/L) found to be raised than control (101.93±10.29 mmol/L) (p<0.005). Mean systolic blood pressure (126.00±18.27 mmHg) found to be raised when compared to (118.00±10.36 mmHg) controls (p<0.02). Mean diastolic blood pressure of cases (81.11±11.33 mmHg) was little higher than control (79.56±7.06 mmHg) (p>0.05).

Conclusion: We found a significant association of systolic blood pressure among stroke patients however, present study failed to make any significant association of hyperglycemias with stroke.

Keywords: hypertension, diabetes mellitus, complications, stroke, cardio vascular diseases

INTRODUCTION

Stroke has been reported to be one of the important and major healthcare issues in both developing and developed countries causing many deleterious effects at individual, family and society of the country.¹

Hypertension, diabetes, smoking and dyslipidemia are the most common modifiable risk factors for the development of stroke. Among them, diabetes mellitus is well established by previous authors.² Presence of diabetes which is mainly characterized by the presence of hyperglycaemia causes the changes in blood vessels of different organs. If the deteriorating effects of hyperglycaemia is at cerebral vessels can lead to stroke. Also patients with uncontrolled diabetes have higher chances of stroke and poor outcome post stroke as compared to those with control glycemic parameters in patients.³

Based on the 30 different trials, hypertension (High blood pressure) has been reported to be more prevalent risk factors for the development of stroke. Previous reports have shown that hypertension was present in 64% of the patients having stroke.^{4, 5} Though previous reports have shown lower risk of stroke among the low income countries, the in-hospital mortality were found to be higher

may be due to delays in presentation for seeking stroke care.⁶

Understanding the both the risk factor in relation to stroke presence can help the physician to decrease the mortality due to stroke. In present study we tried to evaluate the role of hypertension and diabetes which are characterized by the presence of high blood pressure and hyperglycaemia in stroke patients.

MATERIALS AND METHODS

Present case-control study was performed on 90 subjects in the Department of General Medicine at Sri Aurobindo Medical College and PGI, Indore (M. P.) for one and half year from June-2015 to March-2016.

Patients with first ever episodes of ischemic stroke presenting within two weeks of the event having age between 15 years to 45 years and those willing to give informed consent were included in the present study. Patients with non-hemorrhagic stroke, renal, hepatic thyroid dysfunction, collagen vascular diseases, chronic inflammatory diseases like HIV, syphilis, tuberculosis, cancer, patient on steroids and anticonvulsants, pregnancy state and Postpartum period and patients with rheumatic heart disease were excluded from the present study.

Study cohort was divided in to two groups as Cases (n=45; patients with ischemic stroke visited/admitted at study center with weakness of limb, and a rise in serum biomarkers of stroke) and Control (n=45; recruited from hospital staff or individuals who accompany patients referred to the hospital).

Clinical information including age, sex, history of current evidence of hypertension [systolic blood pressure (SBP) "140 mmHg and diastolic BP "90 mmHg]10, Diabetes Mellitus (DM) [fasting blood glucose 7 mmol/L/126 mg] were recorded for all subjects. Estimation of serum fasting blood sugar (FBS) and postprandial blood sugar (PPBS) was done by Hexokinase method.

All the data analysis was performed using IBM SPSS ver. 20 software. Cross tabulation and frequency distribution was used to prepare the tables. Quantitative data was expressed as mean and standard deviation whereas categorical data is expressed as number and percentage. Chi square test was used to compare the categorical data. P value of <0.05 is considered as significant.

RESULTS

The age of all cases and controls found to be in the ranges from 15 to 45 years. The mean age of all samples (n=90) was 36.53±7.53 years. The mean age for the case group was 36.80±7.90 years and found within ranges from 15 to 45 years while for controls was 36.27±7.22 years had ranges from 20 to 45 years. Out of a population of ninety, more than half (56, 62.2%) of the subject was male while rest (34, 37.8%) was female

Table 1: Distribution and Association of Hypertension with Groups

Hypertension	Cases	Control	Total
No	41 (91.1)	45 (100.0)	86 (95.6)
Yes	4 (8.9)	0 (0)	4 (4.4)
Total	45 (100.0)	45 (100.0)	90 (100.0)

$\chi_1^2 = 4.19$ and $p < 0.05$ (Significant)

Hypertension was recorded among four (8.9%) patients of case group. None of the control detected with hypertension. The differences of proportion in hypertension among subjects were associated significantly ($p < 0.05$) with groups (case and control) that confirmed statistically.

Diabetes mellitus was diagnosed in 2 (4.4%) ischemic stroke patients of case group. None of the control detected with diabetes mellitus. The differences of proportions of samples with diabetes mellitus were not associated significantly ($p > 0.05$) with groups (case and control) that was concreted statistically. Henceforth, the statistical agreement projected that the diabetes mellitus wasn't the significant factor that impacted the groups, case and control.

Table 2: Comparison of FBS, PPBS, SBP and DBP between the groups

Variable	Group	Mean value	Mean Diff	Z-value	P value
FBS (mmol/L)	Case	83.98±8.68	3.04	1.80	>0.05 [⊗]
	Control	87.02±7.32			
PPBS(mmol/L)	Case	122.29±46.37	20.36	2.88	<0.005 [#]
	Control	101.93±10.29			
SBP (mmHg)	Case	126.00±18.27	8.00	2.56	<0.02 [*]
	Control	118.00±10.36			
DBP (mmHg)	Case	81.11±11.33	1.55	0.78	>0.05 [⊗]
	Control	79.56±7.06			

[#] The mean differences between groups are highly significant at the 0.005 and 0.001 levels of significance. ^{*} The mean differences between groups are significant at the 0.02 level of significance. [⊗] The mean differences between groups aren't significant (insignificant) at the 0.05 level of significance. [SD: Standard Deviation; Mean Diff: Mean Difference]

DISCUSSION

Both high blood pressure mainly SBP and hyperglycemia have been reported as the significant risk factors for the development of stroke. Indian being the diabetes capital after China are at more at risk of stroke.¹ Hypertension is the most prevalent risk factor for stroke.⁷

Hypertension has been documented as one of the major risk factor for the development of ischemic stroke.⁸ In present study mean systolic blood pressure found to be raised among the patients with stroke when compared to controls. Yang et al and Straus et al has also showed that elevated SBP is direct, continuous and independent risk factors for the development of stroke^{9, 10} which is in line with the present study findings. Previous trials have advocated the importance of controlling blood pressure especially SBP which has shown a strong relationship in reducing the risk of stroke.¹¹⁻¹³ Guidelines recommends the BP goal of <130/80 mm Hg for hypertensive diabetes patients having increased risk of stroke development.¹⁴

Previous reports highlighted that presence of diabetes had three time more risk of stroke compared to normal population.^{15, 16} Results of Framingham Heart Study also highlighted that patients with glucose intolerance had twice the risk for brain infarction compared to those without glucose intolerance. The risk is higher in women than the men. Risk of stroke is higher among the individuals with age between 40-60 years.^{17, 18} In present study diabetes mellitus was diagnosed in 2 (4.4%) ischemic stroke patients of case group. None of the control detected with

diabetes mellitus. The differences of proportions of samples with diabetes mellitus were not associated significantly ($p>0.05$) with groups (case and control) that was concentered statistically. Henceforth, the statistical agreement projected that the diabetes mellitus wasn't the significant factor that impacted the groups, case and control. This may be due to the small sample size of the present study. The possible mechanism for the increased risk of stroke due to hyperglycemia may be due to increase in the brain lactate production and facilitates conversion of hypoperfused at risk tissue into areas of infarction.¹⁹ Also hyperglycemia which is defined as blood glucose level >140 mg/dl decrease the beneficial effect of early restoration of blood flow.²⁰

Small sample size and cross sectional natures were the main limitations of the present study. More randomized clinical trials are needed to provide strength to present study findings.

CONCLUSION

Based on the present study we can conclude that both systolic blood pressure and presence of hyperglycaemia are the major risk factors are the development of stroke, however, in our study we did not find the significance association of presence of diabetes mellitus to be a risk factors for stroke that may be due to the limitations of the present study. We recommend to screen and look for higher systolic blood pressure and hyperglycaemia in individual for the risk of stroke.

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