ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 6, Issue – 2, March- 2023, Page No. : 102 - 106

Measuring blood pressure and blood sugar levels ischemic stroke patients

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How to citation this article: Md Dilawez Shamim, "Measuring blood pressure and blood sugar levels ischemic stroke patients", IJMACR- March - 2023, Volume – 6, Issue - 2, P. No. 102 – 106.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objective: Patients with high blood pressure and high blood sugar have greater rates of mortality and morbidity. It will be easier to reduce mortality and morbidity if we can understand the correlation with stroke patients. Studying the impact of elevated blood pressure and blood sugar levels in stroke patients was one of the aims and objectives.

Method: 100 people were examined in the Department of Medicine, Prasad Institute of Medical Science (PIMS) & Hospital, Lucknow for one and a half years from June 2021 to March 2022 after being split into Cases (n = 50; patients with stroke) and Controls (n = 50; subjects without stroke). All of the subjects had their systolic and diastolic blood pressure, as well as their fasting and postprandial blood sugar levels, assessed.

Results: The mean fasting blood sugar of the patients was slightly lower (83.97±8.67 mmol/L) than the control group (87.01±7.31 mmol/L) ($p>0.04$). Mean post-meal blood sugar levels were observed to be higher in cases (122.28±46.36 mmol/L) than in controls (101.92±10.28 mmol/L) ($p<0.004$). When compared to controls (118.01±10.35mmHg), the mean systolic blood pressure was found to be higher ($p<0.01$). The mean diastolic blood pressure of the patients was marginally higher (81.10±11.32 mmHg) than the control (79.55±7.05 mmHg) ($p>0.04$).

Conclusion: Systolic blood pressure among stroke patients was shown to be significantly correlated, however, hyperglycemia was not found to be significantly correlated in the current study.

Keywords: cardiovascular illnesses, complications from diabetes mellitus, hypertension, and diabetes complications

Introduction

According to reports, stroke is one of the most significant healthcare problems in both developed and developing nations, having a negative impact on the individual, the family, and the nation's society [1].

The most frequent modifiable risk factors for the development of stroke include hypertension, diabetes, smoking, and dyslipidemia [Figure 1]. Among them, diabetes mellitus has a strong scientific foundation [2].

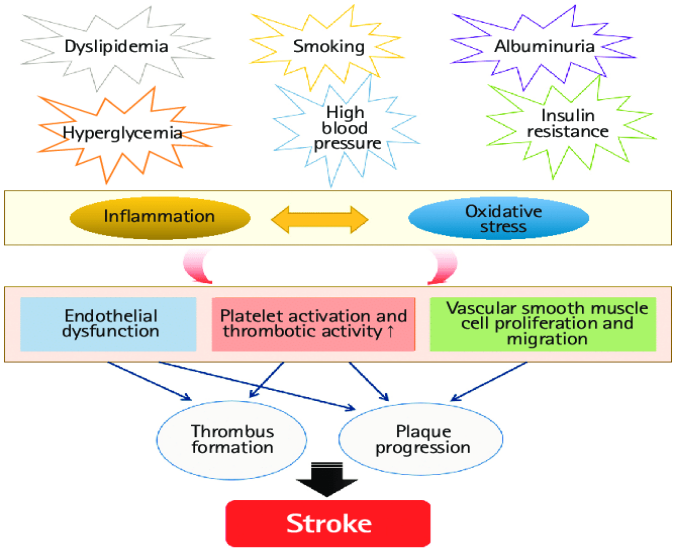

Figure 1: Risk factors associated with Stroke

Changes in the blood arteries of many organs are brought on by the presence of diabetes, which is primarily characterized by the presence of hyperglycemia. A stroke may result if the worsening effects of hyperglycemia are at cerebral vessels. Moreover, people with uncontrolled diabetes have a higher risk of stroke and a worse prognosis after a stroke compared to those with regulated glycemic parameters [3].

According to the 30 various investigations, high blood pressure and hypertension are the more common risk factors for stroke development. According to earlier studies, hypertension was prevalent in 64% of stroke patients [4, 5]. Although earlier studies indicated that low-income countries had a reduced incidence of stroke, it was discovered that in-hospital mortality was higher. This may be because stroke patients waited longer to arrive for therapy [6].

The physician can reduce stroke-related mortality by having a better understanding of the two risk factors in connection to the existence of stroke. In the current study, we attempted to assess the significance of diabetes and hypertension, conditions characterized by the presence of high blood pressure and hyperglycemia in stroke patients.

Method

Study design: The current case-control study was conducted for one and a half years, from June 2021 to March 2022, at the Department of Medicine, Prasad Institute of Medical Science (PIMS) & Hospital, Lucknow.

Methodology: All subjects' clinical details, such as age, gender, history of current evidence of hypertension [systolic blood pressure (SBP) "140 mmHg and diastolic blood pressure "90 mmHg] [10], and Diabetes Mellitus (DM) [fasting blood glucose 7 mmol/L/126 mg], were noted. By using the hexokinase technique, serum fasting blood sugar (FBS) and postprandial blood sugar (PPBS) were estimated.

Sample Size: 100 patients that met the inclusion criteria were eligible for this investigation. The study cohort was split into two groups: Cases (n = 50; ischemic stroke patients visited/admitted to the study center with limb weakness and an increase in serum biomarkers of stroke) and Controls (n = 50; recruited from hospital employees or people who accompany patients referred to the hospital).

Inclusion Criteria: The current study included patients who had their first ischemic stroke episodes within two weeks of the incident, were between the ages of 14 and 44 and were willing to provide informed permission.

Exclusion Criteria: Patients with non-hemorrhagic stroke, renal, hepatic, thyroid dysfunction, collagen

vascular diseases, chronic inflammatory diseases like HIV, syphilis, tuberculosis, and cancer, patients taking steroids and anticonvulsants, pregnancy and the postpartum period, and patients with rheumatic heart disease were excluded from the current study.

Statistical Analysis: The IBM SPSS version 20 software was used for all data analysis. The tables were created using frequency distribution and cross-tabulation. While categorical data are expressed as a number and a percentage, quantitative data were expressed as a mean and standard deviation. The categorical data were compared using the chi-square test. P value <0.04 is regarded as noteworthy.

Ethical Consideration: The Ethical committee of Prasad Institute of Medical Science (PIMS) & Hospital, Lucknow approved this study.

Results

According to data from Table 1, all patients and controls were between the ages of 14 and 44. All participants' average ages (n=100) were 36.52±7.52 years. The mean age of the case group was 36.81±7.91 years, with a range of 14±44 years, while the mean age of the control group was 36.26±7.21 years, with a range of 21 to 44 years. 100 people were involved, 65 (62.1%) of them were male and the remaining 35 (37.9%) were female.

Table 1: Distribution and Groups with Which Hypertension Is Associated

Hypertension	Cases (%)	Control	Total
Yes (%)	8.8%	0.1%	4.3%
No (%)	91.2%	99.9%	95.7%
Total (%)	100%	100%	100%
$\chi i^{2=}$4.18 and P < 0.04 (Significant)			

Three (4.3%) of the case group's patients with ischemic stroke had diabetes mellitus diagnosed. No controls were found to have diabetes mellitus. The statistically concreted categories (case and control) did not substantially differ in their proportions of samples with diabetes mellitus (Table 2; p>0.04). Thus, the statistical consensus predicted that diabetes mellitus wasn't a significant factor that affected the case and control groups.

Table 2: Comparison of the groups' FBS, PPBS, SBPs, and DBPs

Criteria	Group	Mean Value	Mean Difference	Z-Value	P-Value
PPBS (mg/dl)	Case	122.28±46.36	20.35	2.87	<0.004
	Control	101.92±10.28			
FBS (mg/dl)	Case	83.88±8.67	3.03	1.81	>0.04
	Control	87.01±7.31			
SBP (mg/dl)	Case	126.01±18.26	8.01	2.55	<0.01
	Control	118.01±10.35			
DBP (mg/dl)	Case	81.10±11.32	1.56	0.77	>0.04
	Control	79.55±7.05			

Discussion

Hyperglycemia and high blood pressure, particularly SBP, have both been identified as important risk factors for the development of stroke. Indians are greater at risk for stroke because they are China's second-largest diabetes market [1]. The most common risk factor for stroke is hypertension [7]. One of the main risk factors for the development of an ischemic stroke has been identified as hypertension [8]. In the current study, mean systolic blood pressure was found to be higher in stroke patients than in controls. In line with the findings of the current investigation, Yang et al. and Straus et al. also demonstrated that increased SBP is a direct, ongoing, and independent risk factor for the development of stroke [9,10].

Earlier studies [11–13] have emphasised the significance of managing blood pressure, particularly SBP, which has demonstrated a substantial correlation in lowering the risk of stroke. For individuals with hypertensive diabetes

who are at higher risk of developing a stroke, guidelines advise aiming for a blood pressure goal of less than 130/80 mm Hg [14].

Earlier studies showed that people with diabetes had a three times higher risk of stroke than people in the general population [15, 16]. The Framingham Heart Study's findings also showed that patients with glucose intolerance had a twice as high risk of cerebral infarction as those without it. Women are more at risk than males are. Those between the ages of 40 and 60 have an increased risk of stroke [17, 18].

4.3% of the case group in the current study's ischemic stroke patients had diabetes mellitus identified. No controls were found to have diabetes mellitus. The statistically concreted categories (case and control) did not substantially differ in their proportions of samples with diabetes mellitus ($p>0.04$). Thus, the statistical consensus predicted that diabetes mellitus wasn't a significant factor that affected the case and control groups.

This might be as a result of the current study's limited sample size. The increased brain lactate generation that promotes the conversion of hypoperfused at-risk tissue into regions of infarction may be the mechanism by which hyperglycemia increases the risk of stroke [19]. Moreover, the positive effects of an early blood flow restoration are diminished by hyperglycemia, which is characterised as a blood glucose level greater than 140 mg/dl [20].

Conclusion

Based on the current study, it can be said that systolic blood pressure and the presence of hyperglycemia are both significant risk factors for the development of stroke. However, due to the present study's limitations, we were unable to find a significant association between diabetes mellitus and stroke risk. It is advised to screen for greater systolic blood pressure and hyperglycemia in people to check for stroke risk.

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