Research Article

Relation of hyperglycemia with type of stroke in non-diabetics

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ABSTRACT

Objective: To assess the relation of hyperglycemia with type of stroke in non-diabetics
Materials & Methods: This cross sectional study was conducted at Department of Medicine, Jinnah Hospital, Lahore from June 2017 to December 2017. Total 171 patients with acute stroke were selected and hyperglycemia was assessed.
Results: Mean age of the patients was 53.82 ± 10.31 years. Total 44 (25.73%) patients of acute stroke were found with hyperglycemia. Hyperglycemia was noted in 4 (17.39%) patients, 13 (29.55%) patients, 15 (28.30%) patients and 12 (23.53%) patient respectively in age group 30-40 years, 41-50 years, 51-60 years and 61-70 years. Hyperglycemia was noted in 19 (21.35%) male patients and in 25 (30.49%) female patients. Statistically insignificant association between hyperglycemia and gender was noted with p value 0.172
Conclusion: Findings of this study showed higher rate of hyperglycemia in non-diabetic patients presenting with acute stroke. There is insignificant association of hyperglycemia with age, gender, duration of disease and with type of stroke was noted.

Keywords: Stroke, ischemic, glucose, IHD, CVA, CVI

INTRODUCTION

Stroke is the third common cause of death in the world after coronary heart disease and cancer especially in the elderly.[1-2] In 2010, world-wide prevalence of stroke was 33 million.[3] Contrary to decline in the incidence of the disease in the western population, the burden of the disease in South Asian countries (India, Pakistan, Bangladesh, and Sri lanka) has inclined and is expected to rise[3] Hyperglycemia during acute illness can be due to some drugs such as systemic corticosteroids, thiazides, phenytoin, phenothiazines, protease-inhibitors, and beta-agonists or as a result of "stress hyperglycemia" where counter-regulatory hormones such as glucagon, cortisol, catecholamines, and growth hormone promote hepatic gluconeogenesis. Hyperglycemia detected during acute illness may also be the first clinical evidence of underlying undiagnosed type 2 diabetes.mellitus.[4] High proportion of patients may develop hyperglycemia after an acute stress such as stroke or myocardial infarction even in the absence of preexisting diagnosis of diabetes mellitus.5 Hyperglycemia during hospital admission, in patients who are not known to have diabetes associated with adverse outcomes.[5-6] Hyperglycemia after stroke increases during the first 12 hours and then decreases or establishes within one to few weeks.[6]

Results of this study may help clinicians to early manage the hyperglycemia, with early

management of glycaemia in stroke patients, doctors may able to decrease mortality and morbidity of such patients.

OPERATIONAL DEFINITION
Non-diabetics:
Patients with no history of diabetes in past and normal HbA1c level ($\leq 5.6\%$) on presentation was labeled as non-diabetic.

Acute stroke:
As per WHO definition acute stroke is defined as "rapidly developing symptoms/signs (<24 hours duration) of focal (weakness of one side of body, speech disturbances and cranial nerve palsy) and at a time global loss (loss of consciousness i.e. GCS<8/15) of cerebral function without apparent cause other than that of vascular origin" and non-contrast CT brain showed loss of gray-white interface, hypodensity of basal ganglia and insular cortex, high attenuating (bright) clot and the low attenuating (dark) cerebrospinal fluid (CSF) and normal brain tissue.

MATERIAL AND METHODS
Total 171 stroke patients from Department of Medicine Jinnah Hospital, Lahore from June 2017 to December 2017 either male or female, having age 30-70 years were selected for this study. Known patients of diabetes mellitus, patients with head injury patients with recurrent attack and patients with acromegaly or hypergonadisim were excluded from the study.

After taking relevant history, blood pressure and BMI of each patient was calculated and looked for hypertension (yes/no) and obese/non-obese. Then blood sample of each patient was drawn and sent to the pathology laboratory of the institution for measurement of blood glucose levels. Blood glucose levels > 11.1 mmol/l (200 mg/dl) was considered as hyperglycemia and noted as present or absent. All this data was recorded on a predesigned proforma.

All the collected data was entered in SPSS version 17 and analyzed. Mean and SD was calculated for numerical variables. Frequencies was calculated for categorical variables. Chi-square test was used as test of association. P value ≤ 0.05 was considered as significant.

RESULTS
This study was consisted on 171 patients with acute stroke. Mean age of the patients was 53.82 ± 10.31 years. Total 44 (25.73%) patients of acute stroke were found with hyperglycemia. (Fig. 1) Stratification of hyperglycemia was done for age groups and four age groups was made i.e. age group 30-40 years, 41-50 years, 51-60 years and 61-70 years. Hyperglycemia was noted in 4 (17.39%) patients, 13 (29.55%) patients, 15 (28.30%) patients and 12 (23.53%) patient respectively in age group 30-40 years, 41-50 years, 51-60 years and 61-70 years. Insignificant association of hyperglycemia with age group was noted with p value 0.686. (Table 1)

Male patients were 89 (52.05%) and female patients were 82 (47.95%) and hyperglycemia was noted in 19 (21.35%) male patients and in 25 (30.49%) female patients. Statistically insignificant association between hyperglycemia and gender was noted with p value 0.172. (Table 2)

Mean duration of disease was 10.29 ± 6.53 hours. Stratification of hyperglycemia was done for duration of disease. Two groups were made ≤ 12 hours and >12 hours duration of disease. Total 110 (64.33%) patients found with ≤ 12 hours of duration of disease and hyperglycemia was found in 25 (22.73%) patients, 61 (35.67%) patients with >12 hours duration of disease and 19 (31.15%) patients were found with hyperglycemia. No association (P:0.228) of hyperglycemia with duration of disease was found. (Table 3)

Among the 171 patients, 93 (54.39%) found with Hemorrhagic stroke and 78 (45.61%) found with Ischemic stroke and hyperglycemia was found in 24 (25.81%) and

20 (25.64%) patients with hemorrhagic stroke and ischemic stroke respectively. Insignificant (0.980) association of hyperglycemia with type of stroke was found. (Table 4)
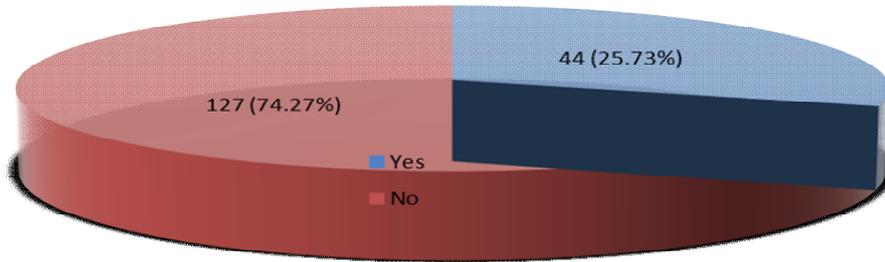
Figure 1: Prevalence of Hyperglycemia

Table 1: Relation of Hyperglycemia age groups

Age (years)	Hyperglycemia			p-value
	Yes (%)	No (%)	Total (%)	
30-40	04 (17.39)	19 (82.61)	23 (13.45)	
41-50	13 (29.55)	31 (70.45)	44 (25.73)	
51-60	15 (28.30)	38 (71.70)	53 (30.99)	0.686
61-70	12 (23.53)	39 (76.47)	51 (29.82)	
Total	44 (25.73)	127 (74.27)	171	

Table 2: Relation of Hyperglycemia with gender

Gender	Hyperglycemia			p-value
	Yes (%)	No (%)	Total (%)	
Male	19 (21.35)	70 (78.65)	89 (52.05)	
Female	25 (30.49)	57 (69.51)	82 (47.95)	0.172
Total	44 (25.73)	127 (74.27)	171	

Table 3: Relation of Hyperglycemia with duration of disease.

Duration of disease (in hours)	Hyperglycemia			p-value
	Yes (%)	No (%)	Total (%)	
≤12 hours	25 (22.73)	85 (77.27)	110 (64.33)	
>12 hours	19 (31.15)	42 (68.85)	61 (35.67)	0.228
Total	44 (25.73)	127 (74.27)	171	

Table 4: Relation of Hyperglycemia with Type of Stroke

Type of Stroke	Hyperglycemia			p-value
	Yes (%)	No (%)	Total (%)	
Hemorrhagic	24 (25.81)	69 (74.19)	93 (54.39)	
Ischemic	20 (25.64)	58 (74.36)	78 (45.61)	0.980
Total	44 (25.73)	127 (74.27)	171	

DISCUSSION

In our study, hyperglycemia was found in 44 (25.73%) patients, whereas there was no hyperglycemia in 127 (73.27%) patients.In a study that evaluated the dynamics of the hyperglycemia inthe acute ictus, taking a baseline control and another after 24hours, it could be observed that the non-diabetic patients withhyperglycemia kept both at admission and after 24 hours showedhigher rates of dependence, mortality and brain hemorrhages.The different adaptation of the organism to the hyperglycemia inboth groups of patients, with the starting of different mechanismsto face the hyperglycemia, with an already organized adaptationin the diabetic patients, might explain these differences.[7]

The prevalence of previously recognized diabetes mellitus (DM) in acute stroke patients is estimated between 8 - 20%. About 6 - 42% of acute stroke patients have previously un-recognized DM.[8] In a study of supratentorial strokes, DM was diagnosed in 24.8% patients while transient hyperglycemia was seen in 36.3% patients.[9] Zahra F et al[10] in his study has found 20% stroke patients with hyperglycemia who were previously non-diabetics. Zafar A et al[11] in his study has found that in non-diabetics, 58.0% had ischaemic stroke while 42.0% had intracerebralhaemorrhage.

Hyperglycemia is very common in patients of acute stroke, occurring in upto 60% of patients and is believed to aggravate cerebral ischaemia.[9] It leads to intracellular acidosis, accumulation of extra cellular Glutamate, cerebral oedema, blood-brain barrier disruption, and tendency for haemorrhagic transformation.[12] It is observed that between 20 - 40% of patients admitted with ischaemic stroke are hyperglycemic, often without a pre-existing diagnosis of diabetes,[8] which can be due to stress hyperglycemia or undiagnosed diabetes exposed during an acute incident.

CONCLUSION

Findings of this study showed higher rate of hyperglycemia in non-diabetic patients presenting with acute stroke. There is insignificant association of hyperglycemia with age, gender, duration of disease and with type of stroke was noted.

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