

Frequency of Raised HbA1c in Patients Presenting With Ischemic Stroke

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ABSTRACT

Background: Diabetes is a known risk factor for stroke. Unlike fasting and postprandial blood glucose level, HbA1C is not affected by short-term lifestyle changes. Therefore, HbA1C can provide a more accurate glycemic status.

Aim: To determine frequency of raised HbA1c in patients with normal previous blood glucose within last 6m, presenting with ischemic stroke in tertiary care hospital.

Methods: This cross-sectional study was conducted in Indoor Departments of both Medical and Neurology wards, Mayo Hospital Lahore over a period of 6 months from 10th March, 2013 to 9th September 2013. Eighty four ischemic stroke patients were selected from indoor departments of both Medical and Neurology wards of Mayo Hospital, Lahore. Raised HbA1c was determined using American Diabetes Association criteria. Bias effect was controlled by having random blood glucose levels measured from single laboratory of Mayo hospital and HbA1c levels measured from most reputed private laboratory as this investigation was not available in Mayo hospital.

Results: Mean age of the patients was 56.6±13.6 years. 56(66%) patients were males and 28(34%) were females. Male to female ratio was 2:1. Out of 84 patients, a total of 29(35%) were having raised HbA1c while 55 (65%) were having normal HbA1c.

Conclusion: Raised HbA1c was found in a significant number of pts suffering from ischemic stroke.

Keywords: Ischemic stroke, HbA1c, Frequency

INTRODUCTION

Rapidly developing clinical signs of focal or diffuse neurological deficit (weakness of limbs, sensory loss, speech, swallowing disturbance) lasting more than 24 hours with no apparent cause other than vascular determined on CT scan¹. The symptoms of brain ischemia may be transient lasting seconds to minutes, or may persist for longer periods of time.² This can be due to ischemia caused by blockage or a hemorrhage.³ The affected area of the brain cannot function, which might result in an inability to move one or more limbs on one side of the body, inability to understand or formulate speech, or an inability to see one side of the visual field⁴.

The most important modifiable risk factors for stroke are high blood pressure and atrial fibrillation.⁵ Other modifiable risk factors include high blood cholesterol levels, diabetes, cigarette smoking⁶ (active and passive), heavy alcohol consumption⁷ and drug use⁸, lack of physical activity, obesity, processed red meat consumption⁹ and unhealthy diet¹⁰. The drugs most commonly associated with stroke are cocaine, amphetamines causing hemorrhagic stroke, but also over-the-counter cough and cold drugs containing sympathomimetics¹¹.

Stroke is one of the four leading causes of death in most countries and number one cause of disability among adults¹². Men are 25% more likely to suffer strokes than women¹³. Disability affects 75% of stroke survivors enough to decrease their employability¹⁴. Stroke can affect peoples physically, mentally, emotionally, or a combination of the three. The results of stroke vary widely depending on size and location of the lesion¹⁵. 30 to 50% of stroke survivors suffer post stroke depression, which is characterized by lethargy, irritability, sleep disturbances, lowered self-esteem, and withdrawal¹⁶.

People with diabetes have more than double the risk of ischemic stroke after correction for other risk factors relative to individuals without diabetes.¹² The HbA_{1c} level is proportional to average blood glucose concentration over the previous four weeks to three months.¹⁷ Monitoring HbA_{1c} in diabetic patients may improve outcomes¹⁸. There is a significant proportion of people who are unaware of their elevated HbA_{1c} level before they have blood laboratory work.¹⁹ Value of HbA_{1c} ≥ 6.5% is considered as abnormal^{20,21}.

There is strong association of raised HbA1c and ischemic stroke shown by studies on Caucasian population. A study conducted by Geberhiwot et al²² showed 23% patients with normal blood sugar levels had raised HbA1c levels. I feel that establishing a strong association between HbA1c and stroke; we can prevent this disastrous illness which can cause significant mortality and permanent disability.

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PATIENTS AND METHODS

This cross-sectional study comprised 84 cases and was conducted in Indoor Departments of both Medical and Neurology wards, Mayo Hospital Lahore over a period of 6 months from 10th March, 2013 to 9th September 2013. Patients age >20 years either sex, ischemic stroke and blood sugar level to be normal within last 6 months were included. All patients taking long term steroids, neurological deficit due to space occupying lesion and meningitis or encephalitis were excluded. Raised HbA1c was determined using American Diabetes Association criteria. Bias effect was controlled by having random blood glucose levels measured from single laboratory of Mayo hospital and HbA1c levels measured from most reputed private laboratory as this investigation was not available in Mayo hospital. The collected data was entered into SPSS 19 and analyzed.

RESULTS

Mean age of the patients was 56.6±13.6 years. 51.2% of patients was found in age range of 61-80 (Table 1). Out of 84 patients, there were 56(66%) males and 28(34%) females. Male to female ratio was 2:1 (Table 2). Of the 84 patients, a total of 29 (35%) were having raised HbA1c while 55(65%) were having normal HbA1c (Table 3). Distribution of raised HbA1c according to gender showed that 17(58%) of patients with raised HbA1c were males while 12(42%) were females (Table 4). Of the 55 patients having normal HbA1c, 40(72%) were males and 15(28%) were females (Table 5).

Table 1: Distribution of subjects according to age (n=84)

Age (years)	Frequency	Percent
20 - 40	8	9.5
41 - 60	33	39.3
61 - 80	43	51.2

Table 2: Distribution of subjects according to sex (n=84)

Sex	Frequency	Percent
Male	56	66.7
Female	28	33.3
Male:female ratio	2:1	

Table 3: Distribution of subjects according to HbA1c (n=84)

HbA1c	Frequency	Percent
Raised	29	34.5
Normal	55	65.5

Table 4: Gender distribution according to raised HbA1c (n=29)

Gender	Frequency	Percent
Males	17	58.0
Females	12	42.0

Table 5: Gender distribution according to normal HbA1c (n=55)

Gender	Frequency	Percent
Males	40	72.0
Females	15	28.0

DISCUSSION

People with diabetes have more than double the risk of ischemic stroke after correction for other risk factors relative to individuals without diabetes. Many cohort studies have investigated the association between blood glucose level and stroke and revealed the relationships of fasting blood glucose level and postprandial blood glucose level with stroke.²³ However, previous studies of fasting glucose concentrations and incident stroke in non-diabetic populations have reported mixed results,²⁴ possibly because a single glucose measurement has high intraindividual variation and is not a good measurement of chronic hyperglycemia, especially in people without overt diabetes.

The HbA1c level is an accurate, precise measure of chronic glycemic levels and correlates more intimately to the risk of complications than single or episodic measures of glucose levels. Our study is the first of its kind in Pakistan to evaluate the relationship between HbA1c and ischemic stroke.

The patients presented to us did not represent a specific area of population or class; however, majority belonged to middle or lower socio-economic status. We investigated a total of 84 patients of ischemic stroke and determined the frequency of raised HbA1c in these patients.

We compared our study results with other internationally published data. A study conducted by Geberhiwot et al²² in 2004 showed 23% patients with normal blood sugar levels had raised HbA1c levels that was 34% in our study. A study conducted by Oh HG et al on Korean non diabetic patients showed that raised HbA1c was associated with odd's ratio of 9.59 for ischemic stroke²⁵. According to a case control study, HbA1c >6.5% was associated with Odds Ratio of 2.95 for stroke.²⁶ According to a cohort study, HbA1c >7% was associated with relative risk of 2.83 for stroke²⁷. Chronic hyperglycemia as indicated by elevated HbA1c levels is associated with a 17% increase in the risk of stroke with each 1% rise of HbA1c²⁸.

Unfortunately, no such study has yet been carried out in Pakistan. Our study is the first of its kind in Pakistan to evaluate the relationship between raised HbA1c and ischemic stroke. Our study showed positive relation between raised HbA1c and ischemic stroke.

CONCLUSION

There is a significant relationship between raised HbA1c and stroke in patients who had normal blood glucose levels in last 6 months. HbA1c should be used as a regular screening test as it shows chronic

hyperglycemia as compared to single blood sugar level.

Further studies should be done to probe into the relationship between HbA1c and ischemic stroke, which could help us in better managing the stroke patients in future

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