PATIENT OUTCOMES AFTER ISCHEMIC STROKE AND HYPERGLYCEMIA

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ABSTRACT

Background: Hyperglycemia has been associated in some research to worse outcomes after a stroke. The likelihood of death and the severity of any resulting bleeding are both factors examined in this article, which focuses on the first 24 hours after a stroke.

Methods: We examined a total of 40 acute ischemic stroke patients who were hospitalized to the Department of General Medicine, Katuri Medical College and Hospital, Guntur, Andhra Pradesh, India, between June 2021 to May 2022. The following criteria were used to choose the patients:

Results: It is not typical for studies to have a male preponderance, and ours, which included 40 patients, was no exception. Fifteen of the patients were between the ages of 51 and 60, making this the largest age group. There were 20 males and 20 females in our study group, or 50% of each sex represented. From dividing the 40 patients into four categories based on age, we learned that 10% were between the ages of 40 and 50, 8% were between the ages of 51 and 60, Ages 61–70 accounted for 12%, while 71–80 made up 10%. From the total of 40 patients, we were able to determine which 15 were at risk for developing hypertension and which 25 were not. Among the total of 40 individuals, we were able to determine that 26 had diabetes and 14 did not.

Conclusions: Hyperglycemia associated with stroke severity, magnitude, and outcome. Diabetes and stress hyperglycemia increase stroke severity and mortality. Admission glucose level affects ischemic stroke outcome. High admission hyperglycemia predicts stroke death and poor functional outcome.

Keywords: Effects of Hyperglycemia, clinical outcomes, patients, ischemic stroke

INTRODUCTION

Nearly 40% of people who have an acute ischemic stroke also have hyperglycemia. Increased infarct size, increased risk of hemorrhagic transformation, and reduced recanalization after intravenous thrombolytic [1] are all ways in which acute hyperglycemia might affect prognosis. Meta-analyses suggest that acute hyperglycemia is associated with in-hospital mortality following ischemic stroke and poor functional recovery in non-diabetic stroke survivors; therefore, a case-controlled retrospective study with better glucose monitoring should be conducted in a clinical practice to further explore the correlation between hyperglycemia and prognosis after acute ischemia [2, 3].

While most studies have focused on entry fasting glucose, continuous monitoring of blood glucose after admission would provide far more comprehensive and precise data on the relationships between glucose levels, early dynamic stroke pathology, and patient outcomes [4, 5]. Hyperglycemia might manifest in one of three ways. Chronic hyperglycemia, newly diagnosed diabetes, and hyperglycemia related to hospitalization that returns to normal following discharge all point to diabetes. Different forms of hyperglycemia are linked to varying outcomes after an ischemic stroke, and this time-varying blood glucose data can assist distinguish between them [6, 7].

There are many different kinds of cerebro vascular accidents, including ischemic stroke, hemorrhagic stroke, and cerebro vascular anomalies such intracranial aneurysm, atrial septal defect, and cortical vein thrombosis. After heart disease, stroke is the largest cause of death from NCDs.The incidence of stroke has decreased drastically since adequate therapy for hypertension was first made available [8]. To a large extent, diabetes mellitus contributes to the development of stroke because of the links it shares with microvascular and macrovascular illness. Glycosylated haemoglobin levels are often elevated in uncontrolled diabetes, which is the case in the vast majority of stroke patients with diabetes [9]. Extremely high blood sugar levels due to stress or diabetes can cause strokes, which can be fatal. Diabetics have a higher than average risk of stroke [10]. Diabetes is associated with an increase in blood pressure, which in turn accelerates atherosclerosis, which in turn promotes intracranial small artery disease, which can cause lacunar infarction, and heart disease, which can cause embolic infarction. Stroke prognosis is influenced by a number of factors. Many studies have focused on hyperglycemia, fever, and neuroprotective drugs. It is crucial to evaluate the random blood glucose level in the early stage (within 24 hours of the commencement) in both diabetics and non-diabetics in order to assess the severity and prognosis of ischemic stroke in relation to hyperglycemia [11-13].

MATERIALSANDMETHODS

A total of 40 acute ischemic stroke patients hospitalized to the Department of General Medicine, Katuri Medical College and Hospital, Guntur, Andhra Pradesh, India, between June 2021 to May 2022were studied. The patients were chosen based on the following criteria:

InclusionCriteria:

1. Patients should be over 40 years old.
2. Patients should have been admitted 24 hours after the beginning of symptoms
3. The patient should be experiencing his or her first cerebrovascular event.
4. Blood sugar levels measured within twenty-four hours of the stroke's beginning

ExclusionCriteria:

1. Stroke victims admitted after twenty-four hours
2. Patients who received intravenous glucose either prior to or throughout the trial
3. It was impossible to provide patients with accurate information regarding diabetes
4. Patients who passed away before it was possible to determine whether they had diabetes
5. The illness had symptoms resembling those of a stroke.

Each patient had a thorough history taken, a clinical examination, and a clinical diagnosis arrived at. Blood pressure is checked, along with electrocardiograms, chest X-rays, blood sugar, urea, creatinine, electrolytes, haemoglobin, total count, and differential count. Each patient's stroke severity is determined using the NIH stroke scale, or NIHSS.

RESULTS

SexDistribution

Amongthe40patientsinourstudygroup,20were male and 20 was the female with the parentage of 50% of each.

Table 1: Sex distribution with frequency and percent

Sex	**Frequency**	**Percent (%)**
Female	20	50
Male	20	50
Total	40	100

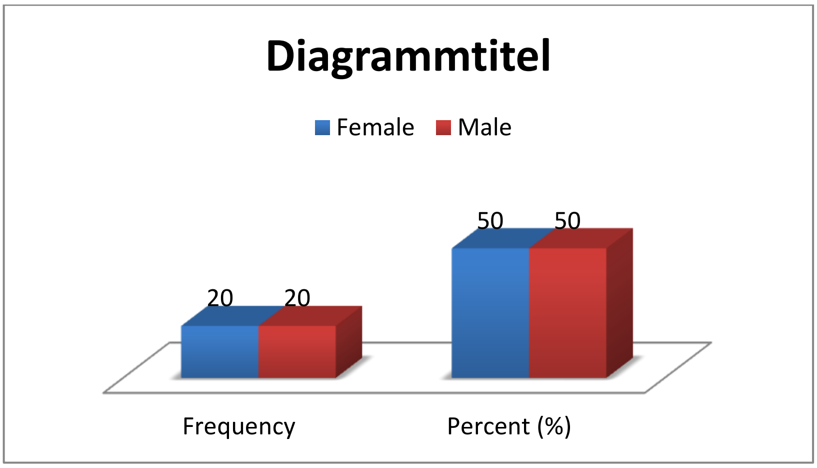

Fig 1: Sex distribution

AgeDistribution data

Table 2: Age wise distribution

Age	**Frequency**	**Percent**
40 to 50Years	10	25
51 to 60Years	08	20
61 to 70Years	12	30
71 to 80Years	10	25
Total	**40**	**100.0**

After age distribution, we discovered 10 patients aged 40-50 years, 08 patients aged 51-60 years, 12 patients aged 61-70 years, and 10 patients aged 71-80 years in our study group of 40 patients.

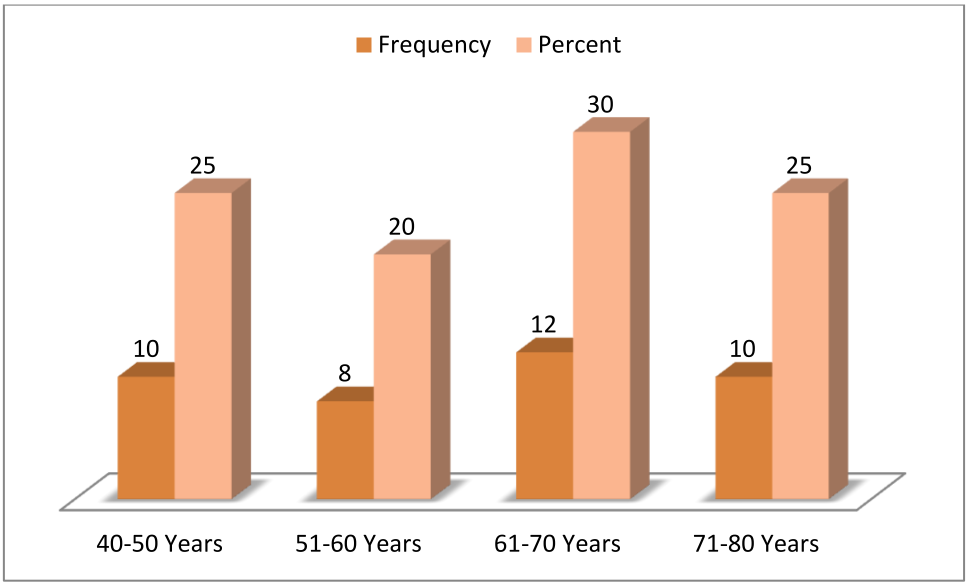

Fig 2: Age wise distribution

Riskfactors

Hypertension

Table 3:Hypertension risk factors

	Frequency	**Percent**
Yes	15	37.5
No	25	62.5
Total	**40**	**100.0**

From the 40 patients we found 15 patients with the hypertension risk and 25 patients with no hypertension risk.

DiabetesMellitus

Table 4: Data on diabetes mellitus

	Frequency	**Percent**
Yes	26	65
No	14	35
Total	**40**	**100.0**

Among the 40 patients, we noticed diabetesin 26 patientsand 14 patients without diabetes mellitus.

Dyslipidemia

Table 5: Data on Dyslipidemia

	Frequency	**Percent**
Yes	21	52.5
No	19	47.5
Total	**40**	**100.0**

From the 40 patients we found 21 patients with the Dyslipidemia and 19 patients with no Dyslipidemia.

Smoker

Table 6: Data on smoker

	Frequency	**Percent**
Yes	20	50
No	20	50
Total	**40**	**100.0**

Among the 40 patients, we noticed diabetesin 20 patientsare active smokers and 20are not.

Alcoholic

Table 7: Data on Alcoholics

	Frequency	**Percent**
Yes	26	65
No	14	35
Total	**40**	**100.0**

Among the 40 patients, we noticed those 26 patientsare alcoholics and 14 patients are not.

GlycemicStatus

BasedonHbA1c

Table 8: Data BasedonHbA1c

	Frequency	**Percent**
KnownDiabetic	26	65
Euglycemic	**04**	**10**
StressHyperglycemics	08	20
NewlyDetected	02	05
Total	**40**	**100.0**

Among the 40 patients, we noticed known diabeticin 26 patients, euglycemic are 04, stress hyperglycemic 08, and newly detected.

Basedon randombloodglucose

Table 9: Basedon randombloodglucose

	Frequency	**Percent**
>199	20	50
126-199	20	50
Total	**40**	**100.0**

Among the 40 patients, we noticed those 20 patients are >199and 20 patients are 126-199.

DISCUSSION

It is not unusual for studies to have a male preponderance, and ours, which included 40 patients, was no exception. Fifteen of the patients were between the ages of 51 and 60, making this the largest age group. There were 20 males and 20 females in our study group, or 50% of each sex represented.We discovered that there were 10 patients in the 40-50 age range, 8 in the 51-60 age range, 12 in the 61-70 age range, and 10 in the 71-80 age range after dividing the 40 patients into four age groups.We identified 15 patients among the 40 patients who were at risk for hypertension and 25 individuals who were not. Of the 40 patients, we identified 26 with diabetes and 14 without diabetes mellitus. We identified 21 patients with dyslipidemia and 19 individuals without it from the 40 patients. We found that 20 of the 40 individuals with diabetes were current smokers, while the other 20 did not. We observed that out of the 40 patients, 26 are alcoholics and 14 are not. We identified recognised diabetes in 26 of the 40 patients, euglycemic in 4, stress hyperglycemic in 8, and newly found in 4. We observed that, out of the 40 patients, 20 are >199 and 20 are 126-199.In this group of 40 patients, some had hypertension, some had diabetes, yet others had hypercholesterolemia, others had a history of myocardial infarction, and one female patient had atrial fibrillation. Two-thirds of the men were smokers, and almost the same percentage also reported drinking in the past.

The NIH Stroke Scale was used to determine how severe the stroke was. Those with hyperglycemia on admission had a higher score than patients with normal glucose levels on admission, and this difference was statistically significant. The average NIHSS was higher in those whose diabetes was not under control. Consequentially, severe stroke was caused by high blood sugar levels at the time of onset [14-16].

CT scans of the brain were used to assess the severity of the damage. Patients with euglycemia often presented with small infarcts, while those with hyperglycemia on arrival frequently displayed bigger lesions accompanied by edoema and a midline shift. These findings are statistically significant, with a p-value of 0.001. Hyperglycemia causes severe brain injury and large infarcts through increasing anaerobic metabolism, brain lactate, decreased mitochondrial activity, vascular disease, free radical generation, and the expression of c-fos and cox-2.Large haemorrhages and the hemorrhagic metamorphosis of infarcts are possible outcomes of hyperglycemia's disruption of the blood-brain barrier [17, 18]. One hundred patients with acute stroke were studied, and those who were euglycemic fared better than those whose blood sugar levels were elevated on the day of admission. Patients with euglycemia recovered faster from an acute stroke [19].

About 72% of euglycemic individuals (both untreated and those who were treated) had a full functional recovery. However, only 3% of hyperglycemic patients on admission day showed good functional improvement by the end of the 30-day follow-up period [20]. Hyperglycemic patients admitted on the same day had an increased risk of dying while hospitalised. Hyperglycemic individuals had a mortality rate of 50% within the first 30 days after hospitalisation. Only 15% of the euglycemic patients ultimately passed away in the first year. Therefore, patients who were hyperglycemic on the day of admission had a threefold greater risk of early mortality compared to euglycemics. Of the patients with hyperglycemia on admission, 38% had a poor result, while just 3% of the euglycemic individuals did [21, 22].

A higher blood glucose level on the day of admission was linked to a higher risk of early mortality and a poorer functional recovery in this research of 40 patients with acute stroke. Results were statistically significant, with 2=21.819 and p0.0001. Early mortality rates for patients with ischemic stroke were 2.07% in the euglycemic group and 14.8% in the hyperglycemic group. 3.18 percent of euglycemics and 38.3 percent of hyperglycemics had unfavourable outcomes. Therefore, hyperglycemia was linked to a significantly higher risk of early mortality and a poorer functional outcome in the ischemic stroke group. The sugar value on the day of admission was found to be significantly associated with stroke severity in our study. If your blood sugar is high when you are admitted, you run a far higher risk of dying and making a slow or no recovery from your illness [23].

Two-thirds of people who had an ischemic stroke were found to have hyperglycemia, according to research by Perttu J. Lindsberg and Risto o Roine. Sixty percent of our ischemic stroke patients had hyperglycemia. One-third of the instances in their study were attributable to preexisting conditions and new diagnoses of diabetes. Those same six people accounted for 62% of our study's data. A 2002 study published in the European Journal of Neurology found that patients whose glucose levels were abnormal after an acute stroke had more severe symptoms than those whose levels were normal. In our study, patients with hyperglycemia had a mean NIHSS of 14.5, while euglycemics had a score of 5.6 [21-23].

A study published in 2002 in Clinical Endocrinology and Metabolism confirmed that patients without a history of diabetes or normoglycemia had a better functional outcome than those with newly found hyperglycemia. Consistent results were seen across a total of one hundred participants with acute stroke. Analyzing 32 related research, Sarah E capes et al. found that those with hyperglycemia had a threefold higher risk of premature death compared to patients with euglycemia. A threefold increase in mortality was associated with hyperglycemia compared to euglycemics 30 days after hospitalization for an ischemic stroke [24].

Increased early mortality was observed in our study, with hyperglycemic ischemia patients dying 3.5 times more often than euglycemic ischemic patients. The findings were consistent even among those who did not have diabetes. Early mortality was increased by a factor of 3.5 in non-diabetic stress hyperglycemic patients with ischemic stroke compared to euglycemics. Because it was unable to determine the sugar value in the diabetics before the commencement of the stroke, the effect of stress in the diabetics was not able to be explored [25].

The study found that compared to euglycemic patients, those with diabetes and stress hyperglycemia had a significantly higher risk of early mortality and a poorer functional recovery. Therefore, it is crucial to validate the improvement in these individuals by stabilizing their blood sugar. Several studies are currently investigating whether or not better Stroke outcomes may be achieved with the use of human recombinant insulin to regulate blood glucose. After a mild to moderate ischemic stroke, patients with hyperglycemia had a better chance of functional recovery and vital activity, as shown by research by Stephan M. Vinychuk et al. The therapeutic value of insulin therapy beyond what is already known remains unknown.

CONCLUSION

The size, severity, and prognosis of an ischemic stroke are all correlated with hyperglycemia on the day of admission. Strokes in people with both diabetes and stress hyperglycemia are more severe and have a greater mortality rate. In patients admitted with an ischemic stroke, glucose levels on the day of admission are significantly linked with outcome. Patients admitted with high glucose levels were more likely to die and had poorer functional outcomes after a stroke. Therefore, promoting normal blood sugar levels as soon as possible is essential. Normalizing the patient's temperature, fluid balance, and hemodynamics are all important parts of stroke therapy that should be followed as we wait for a cure for diabetes.

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