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Original Research Paper

A Comparative Study of Clinical Profile and Outcome of Acute Ischemic Stroke with Hyperglycemia in Nondiabetic and Diabetic Patients

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ABSTRACT:

Introduction & Aim: Stroke is one of the leading causes of premature death and disability in india. Diabetes mellitus by virtue of its association with micro vascular and macrovascular disease is an important risk factor in the genesis of stroke. Recently, evidence has been accumulating about the prognostic influence of hyperglycemia in patients with acute ischemic stroke, and it is becoming an important issue in stroke management. There are some studies which aims to find out course of acute ischemic stroke in diabetic patients but acute ischemic stroke patients who are non diabetic and present with hyperglycemia are less studied hence this study is planned to find out the effect of hyperglycemia in both diabetic and non diabetic acute ischemic stroke patients in terms of severity and prognosis. **Material and Methods**: This was observational prospective comparative study conducted over 100 acute ischemic stroke patients over a period of one year. In our study NCCT head, random blood glucose and HbA1c levels were done within 24 hours of onset of ischemic stroke. Stroke severity at presentation was determined by National Institute of Health stroke scale **(NIHSS**) score and functional outcome was measured at 1 week post admission and after 28 days during follow up using modified Rankin scale. Summary statistics was done by Proportion, Mean, Median and Standard Deviation. The inferential statistics was done by ANOVA and Pearson's correlation. All measurements was done using SPSS version 21.0. 'p' value <0.05 was considered statistically significant. **Observations and Result:** In our study of 100 patients , 72 were diabetics and 28 were nondiabetics. 51 patients had blood glucose level > 199 mg/dl on admission and 49 patients had blood glucose level between 130 mg/dl to 199 mg/dl. Among diabetic patients 5.6 % had minor stroke, 34.7 % had moderate stroke, 37.5 % had moderate to severe stroke and 22.5 % had severe stroke. Among non diabetic patients 25 % had minor stroke, 42.9 % had moderate stroke , 21.4 % had moderate to severe stroke and 10.7 % had severe stroke. Among patients with glucose level > 199 mg/dl, 3.9 % had minor stroke, 31.4 % had moderate stroke, 39.2 % had moderate to severe stroke and 25. 5 % had severe stroke. Among patients with glucose level of 130-199 mg/dl, 18.4 % had minor stroke, 42.9 % had moderate stroke, 26.5 % had moderate to severe stroke and 12.2 % had severe stroke. At the end of one month diabetics and patients with higher glucose level had poor outcome. Among non diabetic patients 82 % patients had favourable prognosis and 18 % patients had unfavourable prognosis while 76 among diabetic patients 58 % patients had favourable prognosis and 42% patients had unfavourable prognosis. P value was 0.025. At the end of one month, among patients with high glucose level (i.e. >199 mg/dl) 54 % had favourable prognosis and 46 % had unfavourable prognosis while among patients with comparatively lower glucose level 75 % had favourable prognosis and 25 % had unfavourable prognosis. P value was 0.03. **Conclusion::** Stroke and diabetes are major health concern in the whole world so it is the need of hour to study about clinical profile including risk factors and prognosis in patients with stroke, and diabetes being one of the most common risk factor it is necessary to study impact of diabetes and hyperglycemia on severity and prognosis of stroke. Our study concluded that diabetic patients had more severe stroke than non diabetic patients with hyperglycemia and diabetic patients also had poor outcome than non diabetic patients with hyperglycemia. Our study also concluded that there is correlation between admission day hyperglycemia and stroke severity and its outcome. Higher glucose level on presentation are associated with more severe stroke and poor functional recovery. Hence, restoration of normoglycemia as soon as possible should be encouraged.

Keywords: Diabetes mellitus , Hyperglycaemia, Acute ischemic stroke.

INTRODUCTION:

A stroke, or cerebrovascular accident, is defined as an abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis. The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature. *Cerebral ischemia* is caused by a reduction in blood flow that lasts longer than several seconds. Neurologic symptoms are manifest within seconds because neurons lack glycogen, so energy failure is rapid. If the cessation of flow lasts for more than a few minutes, *infarction* or death of brain tissue results. When blood flow is quickly restored, brain tissue can recover fully and the patient's symptoms are only transient: this is called a *transient ischemic attack* (TIA). The definition of TIA requires that all neurologic signs and symptoms resolve within 24 h without evidence of brain infarction on brain imaging. Stroke has occurred if the neurologic signs and symptoms last for >24 h or brain infarction is demonstrated.[1] Stroke is one of the leading causes of death and long term disability in India. Stroke is an important cause of premature death and disability in low-income and middle-income countries like India, largely driven by demographic changes and enhanced by the increasing prevalence of the key modifiable risk factors.

Risk factors for stroke:

1. **Non Modifiable Risk factors [2,3]:**

A. Age
B. Sex
C. Race/Ethinicity

2. **Modifiable Risk factors [4,5]:**

A. Diabetes mellitus
B. Hypertension
C. Current smoking
D. Waist-to-hip ratio
E. Diet
F. Physical inactivity
G. Dyslipidemia
H. Alcohol consumption
I. Cardiac causes – atrial fibrillation

Diabetes Mellitus:

Diabetes mellitus (DM) refers to a group of common metabolic disorders that shares the phenotype of hyperglycemia. Several distinct type of DM are caused by a complex interaction of genetics and environmental factors. Depending on the etiology of the DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that imposes a tremendous burden on the individual with diabetes and on the health care system.[6]

HYPERGLYCEMIA AND ISCHEMIC STROKE:

Diabetes mellitus by virtue of its association with micro vascular and macrovascular disease is an important risk factor in the genesis of stroke. Recently, evidence has been accumulating about the prognostic influence of hyperglycemia in patients with acute ischemic stroke (AIS), and it is becoming an important issue in stroke management.[7,8] High glucose levels on admission have been related to poor outcome independent of age, stroke severity, or stroke subtype.[9] Most of the diabetic patients with stroke have raised glycosylated hemoglobin indicating that most of them have uncontrolled diabetes. Diabetics and stress hyperglycemics have severe strokes resulting in poor outcome. Stroke is Twice more common in diabetics than in non diabetics. Hypertension is common in diabetes and accelerates atherosclerosis which promotes intracranial small vessel disease and heart disease leading to lacunar and embolic infarction respectively. There are several risk factors that determine the outcome of stroke. Hyperglycemia, fever, neuroprotective agents are those which are widely studied. There are some studies which aims to find out course of acute ischemic stroke in diabetic patients but acute ischemic stroke patients who are non diabetic and present with hyperglycemia are less studied hence this study is planned to find out the effect of hyperglycemia in both diabetic and non diabetic acute ischemic stroke patients in terms of severity and prognosis.

MATERIAL AND METHODS:

DESIGN OF THE STUDY:

Observational prospective comparative study.

INCLUSION CRITERIA:

1. Willing to give informed consent for the study
2. Patients above the age of forty of both genders.
3. Patients admitted within twenty four hours of onset of symptoms.

EXCLUSION CRITERIA:

1. Patients admitted after twenty four hours of stroke
2. Those patients who received intravenous glucose before or after admission
3. Patients of life threatening conditions like malignencies.
4. Patients less than the age of forty years.

STUDY METHOD:

After an informed consent all subjects were thoroughly assessed at presentation, investigated and treated according to the protocol. Their detailed clinical history, demographic profile and socio-economic status was recorded. Address and contact number of patients was also taken for further communication. Patient's details regarding age, sex, risk factors like hypertension, diabetes mellitus, atrial fibrillation, ischemic heart disease, hypercholesterolemia, smoking, past H/O Ischemic stoke was recorded. The onset of symptoms and signs were recorded. General physical examination as well as complete systemic examination was done. The serum glucose level was measured by using glucometer (a medical device for determining the approximate concentration of sugar level in the blood) and simultaneously by taking venous blood sample in a disposable syringe and sent to laboratory for analysis of random blood sugar , HbA1c , CBC, renal function test and liver function test. Random blood glucose level > 130 mg/dl was considered as hyperglycemia. Patients with history of diabetes or HbA1c $\geq$ 6.5 % were kept in diabetic group and Patients with no history of diabetes and HbA1c < 6.5 % were kept in non diabetic group. Patients with HbA1c less than 8 % were categorized as controlled diabetics and Patients with HbA1c more than 8% were categorized as uncontrolled diabetics. A diagnosis of Acute ischemic stroke was made based on the basis of neuroimaging (CT scan) and Clinical examination. Stroke severity at presentation was determined by NIHSS score and functional outcome was measured at 1 week post admission and after 28 days during follow up using modified Rankin scale. National Institute of Health stroke scale (NIHSS) is a tool used by healthcare providers to objectively quantify the impairment caused by a stroke. The NIHSS is composed of 11 items, each of which scores a specific ability between 0 to 4. For each item a score of 0 typically indicates normal function in that specific ability, while a higher score is indicative of some level of impairment. The individual scores from each item are summed in order to calculate a patient's total NIHSS score. The maximum possible score is 42, with the minimum score being 0.

National Institute of Health Stroke Scale[10]

Ia-Level of consciousness	0=Alert; keenly responsive 1=Not alert, but arousable by minor stimulation 2=Not alert; requires repeated stimulation 3=Unresponsive or responds only with reflex
Ib- Level of consciousness questions: What is your age? What is the month?	0=Answers two questions correctly 1 = Answers one question correctly 2=Answers neither question correctly
Ic-Level of consciousness commands: Open and close your eyes Grip and release your hand	0=Performs both tasks correctly 1=Performs one task correctly 2=Performs neither task correctly
2-Best gaze	0=Normal 1=Partial gaze palsy 2=Forced deviation
3-Visual	0=No visual lost 1=Partial hemianopia 2=Complete hemianopia 3=Bilateral hemianopia
4-Facial palsy	0=Normal symmetric movements 1 =Minor paralysis 2 = Partial paralysis 3=Complete paralysis of one or both sides
5-Motor arm	0=No drift

Left arm Right arm	1= Drift 2 = Some effort against gravity 3 = No effort against gravity 4=No movement
6-Motor leg Left leg Right leg	0= No drift 1=Drift 2 = Some effort against gravity 3 = No effort against gravity 4 = No movement
7-Limb ataxia	0= Absent 1 = Present in one limb 2 = Present in two limbs
8-Sensory	0 = Normal; no sensory loss I = Mild-to-moderate sensory loss 2 = Severe-to-total sensory loss
9-Bestlanguage	0=No aphasia; normal I = Mild-to-moderate aphasia 2 = Severe aphasia asia
10-Dysarthria	0 = Normal 1 = Mild-to-moderate dysarthria 2 = Severe dvsarthria
I I-Extnction and Inattention	0 = No abnom1ality 1= Visual, tactile, auditory, spatial, or personal intention 2 = Profound hemi-inattention or extinction
Score = 0-42	

STROKE SEVERITY SCORE:

SCORE	STROKE SEVERITY
0	No Stroke symptoms
1-4	Minor Stroke
5-15	Moderate Stroke
16-20	Moderate to Severe Stroke
21-42	Severe Stroke

The Modified Rankin Scale is used to measure the degree of disability in patients who have had a stroke, as follows [(11)].

Modified Rankin Scale:

0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual

	duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without Assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Dead

Favourable score mRS:0-3 Unfavourable score mRS:4-6

STATISTICAL ANALYSIS:

All the information was recorded in predesigned proforma formed in Microsoft excel for final analysis.
Summary statistics was done by Proportion, Mean, Median and Standard Deviation. The inferential statistics was done by ANOVA and Pearson's correlation. All measurements was done using SPSS version 21.0. 'p' value <0.05 will be considered statistically significant.

OBSERVATIONS AND RESULTS:

In this study, about 100 cases admitted with AIS, which met inclusion and exclusion criteria were evaluated. At presentation, along with complete history taking, relevant clinical examination scoring was done based on NIHSS score. mRS scoring done at 1 week post admission and 28 days later on the basis of which clinical outcomes were analyzed in this study.

Table: 1. Age wise Distribution

Age Group	No of patients	Percentage
41-50	17	17
51-60	28	28
61-70	38	38
71-80	17	17
Total	**100**	**100**

Observation: Among the study population , 17 (17 %) patients were in age group of 41- 50 , 28 (28%) patients were in age group of 51 – 60, 38 patients (38%) were in age group of 61-70 and 17 (17%) patients were in age group of 71-80.

Table: 2. Gender wise Distribution

Gender	No of patients	Percentage
Female	30	30
Male	70	70
Total	**100**	**100**

Observation: Among the study population of 100 patients , 70 (70 %) were males and 30 (30%) were females.

Table: 3. Past medical history of study population

Risk factor	No of patients
SMOKING	34
ALCOHOLISM	21
IHD	13
DYSLIPIDEMIA	18

DM	72
HYPERTENSION	36

Observation: Diabetes Mellites and Systemic Arterial Hypertension found to be the most common risk factor among study population.

Table: 4. Radio-Imaging Study (MRI / CT brain)

AL TERRITORY INVOLVED	NO OF PATIENTS
MCA INFARCT	64
MULTI INFARCT	14
POSTERIOR CIRCULATION INFARCT	9
LACUNAR INFARCT	13
TOTAL	**100**

Observation: In most of the study population Middle Cerebral Artery is Involved.

Table: 5. Correlation of status of diabetes according to HbA1c and NIHSS at admission

NIHSS	Status of Diabetes		Total	P Value
	Non diabetic n(%) (HbA1c <6.5%)	Diabetic (HbA1c ≥ 6.5%)		
Minor	7(25)	4(5.6)	11(11)	0.016
Moderate	12(42.9)	25(34.7)	37(37)	
Moderate to Severe	6(21.4)	27(37.5)	33(33)	
Severe	3(10.7)	16(22.2)	19(19)	
Total	**28(100)**	**72(100)**	**100(100)**	

Observation: Among diabetic patients 5.6 % had minor stroke, 34.7 % had moderate stroke, 37.5 % had moderate to severe stroke and 22.5 % had severe stroke. Among non diabetic patients 25 % had minor stroke, 42.9 % had moderate stroke , 21.4 % had moderate to severe stroke and 10.7 % had severe stroke.

Table: 6. Correlation of glucose level and NIHSS at admission

NIHSS	Status of RBS		Total	P Value
	130-199 n(%)	>199		
Minor	9(18.4)	2(3.9)	11(11)	0.027
Moderate	21(42.9)	16(31.4)	37(37)	
Moderate to Severe	13(26.5)	20(39.2)	33(33)	
Severe	6(12.2)	13(25.5)	19(19)	
Total	**49(100)**	**51(100)**	**100(100)**	

Observation: Among patients with glucose level > 199 mg/dl, 3.9 % had minor stroke, 31.4 % had moderate stroke, 39.2 % had moderate to severe stroke and 25. 5 % had severe stroke. Among patients with glucose level of 130-199 mg/dl, 18.4 % had minor stroke ,42.9 % had moderate stroke, 26.5 % had moderate to severe stroke and 12.2 % had severe stroke.

Table: 7. Correlation of mRS at 1week and status of Diabetes according to HbA1c

mRS (1 week	Status of Diabetes		Total	P Value
	on diabetic n(%) (HbA1c <6.5%)	Diabetic (HbA1c ≥6.5%)		
0-3	18(64.28)	28(38.8)	46(46)	0.022
>3	10(35.71)	44(61.1)	54(54)	
Total	**28(100)**	**72(100)**	**100(100)**	

Observation: Among diabetic patients, 28 (38.8 %) patients had favourable prognosis and 44 patients (61.1%) had unfavourable prognosis and among nondiabetic patients 18 patients (64.28%) had favourable prognosis and 10 patients (35.71%) had unfavourable prognosis at the end first week.

Table: 8. Correlation of mRS at 1 week and admission day glucose level

mRS(1 week)	Status of RBS		Total	P Value
	130-199 n(%)	>199		
0-3	30(61.2)	16(31.3)	46(46)	0.002
>3	19(38.7)	35(68.7)	54(54)	
Total	**49(100)**	**51(100)**	**100(100)**	

Observation: Among patients with higher admission day glucose level , 16 (31.3%) patients had favourable prognosis and 35 (68.7 %) patients had unfavourable prognosis and among patients with lower admission day glucose level 30 (61.2%) patients had favourable prognosis and 19 (38.7%) patients had unfavourable prognosis at the end of first week.

Table: 9. Correlation of mRS at 28 days and status of Diabetes according to HbA1c

mRS (28 days)	Status of Diabetes		Total	P Value
	on diabetic n(%) (HbA1c <6.5%)	Diabetic n(%) (HbA1c≥ 6.5%)		
0-3	23(82.1)	42(58.3)	65(65)	0.025
>3	5(17.8)	30(42.6)	35(35)	
Total	**28(100)**	**72(100)**	**100(100)**	

Observation: Among diabetic patients, 42 (58.3 %) patients had favourable prognosis and 30 patients (42.6%) had unfavourable prognosis and among nondiabetic patients 23 (82.1%) patients had favourable prognosis and 5 (17.8%) patients had unfavourable prognosis at the end of 28 days.

Table: 10. Correlation of mRS at 28 days and admission day glucose level

mRS (28 days)	Status of RBS		Total	P Value
	130-199 n(%)	>199		
0-3	37(75.5)	28(54.9)	71(71)	0.03
>3	12(24.4)	23(45.1)	29(29)	
Total	**49(100)**	**51(100)**	**100(100)**	

Observation-Among patients with higher admission day glucose level, 28 (54.9%) patients had favourable prognosis and 23 (45.1%) patients had unfavourable prognosis and among patients with lower admission day glucose level 37 (75.5%) patients had favourable prognosis and 12 (24.4%) patients had unfavourable prognosis at the end of 28 days.

Table: 11. Distribution of patients according to status of diabetes and mortality among them

Status Of Patients		No. of Patients	No. of Deaths (% within group)
Diabetic	Uncontrolled	42	6 (14.2)
	Controlled	30	3(10.0)
Nondiabetic		28	2(7.0)
Total		**100**	**11**

Observation: Total 11 patients died in our study among them 6 patients were uncontrolled diabetics and 3 patients were controlled diabetics and 2 patients were nondiabetics. Among each groups of patients highest mortality rate was in uncontrolled diabetics i.e. 14.2 % and controlled diabetics had mortality rate of 10 % while nondiabetics had mortality rate of 7 %.

DISCUSSION:

AGE, SEX AND RISK FACTORS:

In our study of hundred patients majority of them belonged to male sex showing a male preponderance which is commonly seen in most studies. Out of 100 patients 70 patients were male. Majority of the patients, 38 were between the age group of 61 to 70. Among the hundred patients 36 had hypertension, 72 had diabetes, 18 had hypercholesterolemia, 13 had previous history of myocardial infarction, 34 patients were smoker and 21 patients were alcoholic.

GLYCEMIC STATUS:
Among the hundred patients in our study group, 72 patients were diabetic and 28 patients were non diabetic. Among diabetic patients 40 patients had uncontrolled diabetes and 32 patients had controlled diabetes. Among diabetic patients 18 patients were newly diagnosed diabetics.

SEVERITY OF STROKE:
Severity of stroke was assessed with NIH Stroke scaling system. Diabetic patients had a higher score when compared to non diabetic patients, which was statistically significant with p = 0.016. Among diabetic patients 5.6 % had minor stroke, 34.7 % had moderate stroke, 37.5 % had moderate to severe stroke and 22.5 % had severe stroke. Among nondiabetic patients 25 % had minor stroke, 42.9 % had moderate stroke , 21.4 % had moderate to severe stroke and 10.7 % had severe stroke. Patients with admission day glucose level > 199 had a higher score when compared to patients with glucose level of 130-199, which was statistically significant with p = 0.027. Among patients with glucose level > 199 mg/dl, 3.9 % had minor stroke, 31.4 % had moderate stroke, 39.2 % had moderate to severe stroke and 25. 5 % had severe stroke. Among patients with glucose level of 130-199 mg/dl, 18.4 % had minor stroke ,42.9 % had moderate stroke, 26.5 % had moderate to severe stroke and 12.2 % had severe stroke. .Hence diabetic patient had more severe stroke compared to non diabetic patients, and patients with higher blood glucose also had severe stroke compared to patients with comparatively lower blood glucose levels. Hence an elevated blood glucose at the time of stroke resulted in severe stroke in both diabetic and non diabetic patients.

OUTCOME OF STROKE :
In this study diabetic patients had a poor outcome when compared to nondiabetic patients and patients with higher glucose level on admission day had a poor outcome when compared to patients with comparatively lower glucose levels. These datas are statistically significant. At the end of first week, among nondiabetic patients 64.3 % had favourable prognosis and 35.7 % patients had unfavourable prognosis on the contrary among diabetic patients only 38.8 % had favourable prognosis and 61.1 % had unfavourable prognosis. P value was 0.022. At the end of first week, among patients with higher glucose level (i.e. > 199mg/dl) 31 % patients had favourable prognosis and 69 % patients had unfavourable prognosis on the contrary among patients with comparatively lower glucose level 61% patients had favourable prognosis and 39 % patients had unfavourable prognosis. P value was 0.002. Early inpatient mortality was high in diabetics. Among diabetics 9 patients (12.5 %) died and among nondiabetics 2 patients (7 %) patients died in first week. At the end of one month diabetics and patients with higher glucose level had poor outcome. Among nondiabetic patients 82 % patients had favourable prognosis and 18 % patients had unfavourable prognosis while among diabetic patients 58 % patients had favourable prognosis and 42% patients had unfavourable prognosis. P value was 0.025. At the end of one month, among patients with high glucose level (i.e. >199 mg/dl) 54 % had favourable prognosis and 46 % had unfavourable prognosis while among patients with comparatively lower glucose level 75 % had favourable prognosis and 25 % had unfavourable prognosis . P value was 0.03. This study shows that patient with diabetes who had elevated blood glucose level on admission had more severe stroke, high early mortality rate and an increased risk of poor functional recovery.

OTHER STUDIES:
Blanca Fuentes, MD et al [(12)] conducted a multicenter, prospective, and observational cohort study of 476patients with ischemic stroke within less than 24 hours from stroke onset. They concluded that Hyperglycemia 155 mg/dL at any time within the first 48 hours from stroke onset, and not only the isolated value of admission glycemia, was associated with poor outcome independently of stroke severity, infarct volume, diabetes, or age. Our study evaluated the effect of level of hyperglycemia on severity and outcome of stroke and it concluded that higher sugar level are associated with more severe stroke and poor outcome. NinaT. Gentile, MD et al [(13)]:conducted a retrospective study of patients discharged with a diagnosis of ischemic stroke during a 40-month period from a large urban U.S. health system. They concluded that Admission hyperglycemia is associated with a worse outcome after stroke than is euglycemia. Normalization of blood glucose during the first 48 hours of hospitalization appears to confer a potent survival benefit in patients with thromboembolic stroke. Our study also had similar conclusion i.e. hyperglycemia is associated with worse outcome.
Latha G. Stead et al[(14)] conducted a study of 447 consecutive patients who presented to the ED with AIS within 24 h of symptom onset and had blood glucose measured on presentation. They concluded that Hyperglycemia on presentation is associated with significantly poorer outcomes following AIS. Patients with hyperglycemia and no prior history of DM have a particularly poor prognosis, worse than that for patients with known diabetes and hyperglycemia. Our study findings are contrary to this study as in our study diabetic patients with hyperglycemia had more severe stroke than stress hyperglycemics. Vanja Basic Kes, et al[(15)] conducted study For 630 stroke patients admitted to the neurological intensive care department within 24 hours of stroke onset, and they correlated mean blood glucose levels (MBGL) at admission and 72 hours after admission in diabetic and non-diabetic patients with final outcome. Blood glucose levels higher then

6.1mmol/L (121 mg/dL) were treated as hyperglycemia. they concluded that Prolonged stress hyperglycemia in ischemic stroke patients increases the risk of in-hospital 28-day mortality, especially in non-diabetic patients. While in our study diabetic patients with hyperglycemia had poor outcome than nondiabetic patients.

CONCLUSION:

Stroke and diabetes are major health concern in the whole world so it is the need of hour to study about clinical profile including risk factors and prognosis in patients with stroke, and diabetes being one of the most common risk factor it is necessary to study impact of diabetes and hyperglycemia on severity and prognosis of stroke. There are some studies which aim to find out course of acute ischemic stroke in diabetic patients but acute ischemic stroke patients who are nondiabetic and present with hyperglycemia are less studied hence this study was planned to find out the effect of hyperglycemia in both diabetic and nondiabetic acute ischemic stroke patients in terms of severity and prognosis. Our study concluded that diabetic patients had more severe stroke than nondiabetic patients with hyperglycemia and diabetic patients also had poor outcome than nondiabetic patients with hyperglycemia. Our study also concluded that there is correlation between admission day hyperglycemia and stroke severity and its outcome. Higher glucose level onpresentation are associated with more severe stroke and poor functional recovery. Hence, restoration of normoglycemia as soon as possible should be encouraged. Our study also finds that smoking, impared glucose levels and hypertension are most common risk factors for stroke so life style modification should be encouraged to reduce the risk of stroke.

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