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PROGNOSTIC IMPORTANCE OF PLASMA GLUCOSE LEVEL, HBA1C & LIPID PROFILE IN ACUTE CEREBROVASCULAR ACCIDENTS

General Medicine

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ABSTRACT

BACKGROUND: Detection of metabolic abnormalities is important in persons presenting with acute stroke as outcomes may be affected when left untreated. Some metabolic abnormalities that are often documented in stroke patients include dyslipidemia and hyperglycemia. This study was carried out to find the association between plasma levels of different risk factors like glucose, HBA1C and lipid profile in acute cardiovascular accidents.**AIMS AND OBJECTIVE: 1>**To know the glycemic status by estimating the plasma glucose level & HbA1c at the time of hospital admission in cases of acute cerebrovascular stroke patients. **2>**To study the effect of plasma glucose level & HbA1c on the severity of stroke at admission in acute stroke patients with diabetes and without diabetes. **3>**To compare effect of the poor and adequate glycemic status on the severity and functional outcome of stroke. **MATERIALS AND METHODS:** This cross-sectional study included 100 cases, during period of August 2018 to September 2019. We have taken detailed personal history, past history, clinical examination, neurological examination (MRC scale) and laboratory investigations which includes blood pressure, pulse rate, and random blood glucose levels, HBA1C, lipid profile were taken. **RESULT:** Diabetic stroke patients had RBS 254.050±104.66mg.dl compared to 18.96±36.12mg/dl in non-diabetics. The difference was statistically significant and patients with higher admission RBS value had poor outcome. Diabetic stroke patients had longer duration of hospital stay 6.46±1.01 days compared to non-diabetics 3.62±2.84 days. The difference was statistically significant. Triglyceride and LDL levels were statistically significant between two groups. **CONCLUSION:** We conclude that dyslipidemia and hyperglycemia significantly affect the initiation, prognosis and functional outcome in acute CVA cases.

KEYWORDS

Cardiovascular accident, Plasma glucose level, Lipid profile, HBA_1C.

INTRODUCTION:

Stroke is a growing disease and is the third common cause of death in the world after coronary heart disease and cancer especially in the elderly. [1], [2], [3] Stroke or a cerebro-vascular accident is an acute neurological injury which occurs due to vascular pathology and presents as a brain infarction or hemorrhage. Stroke is a medical emergency. Many of the previous clinical investigations have suggested that increased serum cholesterol is a risk factor for ischemic stroke. Its role in Intracerebral hemorrhage (ICH), however, is not clear. Few studies have indicated hypercholesterolemia as a risk factor for ICH. [4]

Diabetes are one of the main risk factors for AIS[5] and has repeatedly shown a negative effect of exacerbating ischemic brain injury, accelerating the molecular processes leading to cell death, and resulting finally in larger infarct volumes and poorer outcomes.[6],[7] It seems that the effect of diabetes on stroke is mainly due to atherosclerosis or induction of an inflammatory reaction which is possibly reversible with treatment.[7],[8] Some studies show that some blood sugar related biomarkers, such as fasting blood sugar or random blood sugar, can be used as prognostic tools in ischemic stroke (IS) patients.[6-9] Hemoglobin A1c (HbA1c) is the form of Hb. It is measured to estimate the average plasma glucose concentration over 2-3-month period. Some recent studies suggest that HbA1c may have prognostic value in patients with AIS.[9]

Detection of metabolic abnormalities is important in persons presenting with acute stroke as outcomes may be affected when left untreated. Some metabolic abnormalities that are often documented in stroke patients include dyslipidemia and hyperglycemia. Non-diabetic patients presenting with an acute stroke often have hyperglycemia and this may be transient and due to the acute stress response or truly representative of undiagnosed abnormal glucose metabolism. [10],[11],[12] Transient hyperglycemia or stress –induced hyperglycemia (SH) during acute illness often occurs in patients without previous evidence of diabetes mellitus. Stress-induced hyperglycemia, typically described as blood glucose concentrations above 200 mg/dl, has been described in the literature for almost 150 years. [10] Acute hyperglycemia has been documented to be a predictor of in hospital mortality after ischemic stroke in nondiabetic patients and increased risk of poor functional recovery in non-diabetic stroke survivors. Possible reasons for this scenario include direct toxicity of hyperglycemia to the brain and the potential neurotoxic effect of acidosis which results from anaerobic cerebral glucose metabolism .[13] The main Objective of this Study is the documentation of the frequency of occurrence of Stress hyperglycemia, undiagnosed DM, DM and dyslipidemia in patients with acute Stroke.[14]

MATERIAL AND METHOD:

Collection of data done by patient evaluation which was done by taking detailed history, clinical examination and laboratory investigations through a proforma specially designed for this study. Patient's blood pressure, pulse rate, and random blood glucose levels were documented. (These data were obtained within 24 hours of admission). Detailed history of age, sex, past history of diabetes mellitus, hypertension, smoking and hyperlipidemia were taken. Detailed neurological examination was done and stroke score based on MRC scale was obtained at the time of admission and discharge.

The biochemical parameters -random blood glucose, and plasma glycosylated hemoglobin (HbA1c), fasting total serum cholesterol, low density lipoprotein (LDL) cholesterol, high density lipoprotein (HDL) & serum triglycerides were done. Samples for biochemical analyses had been taken within 72 hours of hospitalization. A confirmed value of HbA1c at or above 6.5% is used as diagnostic for diabetes mellitus as recommended by the American Diabetes Association.

The diagnosis of Stroke were made clinically and with the aid of radiology scans for some patients. Brain CT/MRI Scans were carried out in most of the patients and delineated between ischemic and hemorrhagic stroke.

STATISTICALANALYSIS:
Intergroup comparisons were done using Pearson's r-test, and mean values were compared using analysis of variance. Statistically significant differences were reported at $p < 0.05$.

RESULT:
Mean Age of stroke patients with diabetic and non-diabetic group was 61.4 ± 12.18 years and 57.38 ± 12.56 years respectively. In our study 35.41% were males and 64.58% were females in diabetic group and 65.38% male and 34.61% female in non-diabetic group. Diabetic stroke patients had RBS 254.050±104.66 mg/dl compared to 118.96±36.12 mg/dl in non-diabetics. The difference was statistically significant. Diabetic stroke patients had longer duration of hospital stay 6.46±1.01 days compared to non-diabetics 3.62±1.09 days. The difference was statistically significant.

Table 1: Baseline Characteristic Of Patients

PARAMETERS	DM (n=48) MEAN ±SD	Non DM (n=52) MEAN ± SD
AGE (years)	61.4 ± 12/18	57.38 ± 12.56
MALE (%)	35.41%	65.38%
FEMALE (%)	64.58%	34.61%
RBS (mg/dl)	254.05 ± 104.66	118.96 ± 36.12
HOSPITAL STAY(days)	6.46 ± 1.01	3.62 ± 1.09

Table 2: Glucose Profile In Stroke Patient:

GLUCOSE PROFILE		No. of Patients (n=100)
HbA1c	<6.5%(Pre Diabetic)	52
	≥6.5 % (Diabetics)	48
FBS	<126 mg/dl	53
	≥126 mg/dl	47
PPBS	<200 mg/dl	63
	≥200 mg/dl	37

Fair recovery rate 41.66% in diabetic group as compared to 61.53% in non-diabetic group. Poor recovery rate 58.33% in diabetic group as compared to 38.46 % in non-diabetic group.

In diabetic group, patients with fair recovery had a mean of RBS 157.2±34.58mg/dl and patients with poor recovery had a mean of RBS 248.32±92.8mg/dl.

In non-diabetic group, patients with fair recovery had a mean of RBS 106.88±28.5mg/dl and patients with poor recovery had a mean of RBS 127.85±37.58 mg/dl.

Table 3. ASSOCIATION BETWEEN OUTCOME & RBS:

DM OUTCOME	RBS (mg/dl)		P VALUE
	MEAN	SD	=0.001 HS
FAIR (n=20)	157.2	34.58	
POOR (n=28)	248.32	92.8	
NON DM OUTCOME	RBS(mg/dl)		P VALUE
	MEAN	SD	=0.00268 S
FAIR (n=32)	106.88	28.5	
POOR (n=20)	127.85	37.58	
OUTCOME	DM(n=48)		NON DM (n=52)
FAIR	20 (41.66%)		32 (61.53%)
POOR	28(58.33%)		20 (38.46%)

Table 4: Lipid Profile In Stroke Patients:

LIPID PROFILE		No. of Patients
CHOL	<200 mg/dl	66
	200-239 mg/dl	25
	≥240 mg/dl	09
LDL	<100 mg/dl	51
	100-129 mg/dl	28
	130-159mg/dl	13
	160-189 mg/dl	04
	≥190 mg/dl	04
HDL	<40 mg/dl	48
	40-60 mg/dl	48
	≥ 60 mg/dl	04
TG	<150 mg/dl	56
	150-199 mg/dl	23
	200-499 mg/dl	20
	≥500 mg/dl	01

Cholesterol level was abnormal in 19(39.58%) diabetics and 15(28.84%) in non-diabetics. Triglyceride level was abnormal in 27(56.25%) diabetics and 17(32.69%) in non-diabetics. HDL level was abnormal in 25(52.1%) diabetics and 23(44.23%) in non-diabetics. LDL level was abnormal in 30(62.5%) diabetics and 19(36.53%) in non-diabetics.

Triglyceride and LDL levels were statistically significant between two groups.

Table 5: Corelation Between Lipid Profile & Hba1c:

LIPID PROFILE		DM (n=48) (%)	NON DM (n=52) (%)	P VALUE
CHOL	NORMAL	29(60.41%)	37(71.15%)	0.179 NS
	ABNORMAL	19(39.58%)	15(28.84%)	
TG	NORMAL	21(43.75%)	35(67.3%)	0.015 S
	ABNORMAL	27(56.25%)	17(32.69%)	
HDL	NORMAL	2(4.16%)	2(3.84%)	0.71 NS
	SUB NORMAL	21(43.75%)	27(51.92%)	
	ABNORMAL	25(52.1%)	23(44.23%)	
LDL	NORMAL	18(37.5%)	33(63.46%)	0.008 S
	ABNORMAL	30(62.5%)	19(36.53%)	

DISCUSSION:
In our study age incidence was more between the age group 51-60 years followed by 61-70 years in both the groups. There was no statistical difference in age between the 2 groups. (P value 0.1NS). Similarly others studies also had stroke patients in old age.

In our study the male predominated in non-diabetic stroke group (65.38%) which was comparable to other studies. In DM group female (64.58%) predominated in our study which was different to other studies.

In present study, on admission RBS level was high in diabetics (254.05±104.6mg/dl) compared to non-diabetics (118.96± 36.12mg/dl). Similar correlation observed in Venkatesh et al [15], Kamel A et al [16].

Duration of hospital stay was longer in diabetics than non-diabetics. In present study duration of hospital stay 6.46±1.01 days in diabetics compared to non-diabetics 3.62±2.84 days. Similar findings observed in Kamel A et al [16] study, 8.36±4.64 days in diabetics compared to 5.46±2.86 days in non-diabetics.

In our study and Kamel A et al [16] study, patients with high admission RBS had poor outcome and statistically significant. Similar observation were made by Megherbi SE et al [17], Kamel A et al [16] and in the Copenhegan stroke study (Jorgesen H et al [18] 1994).

In our study, Difference of Triglyceride and LDL levels were higher in diabetics than non-diabetics and statistically significant (p value 0.015, 0.008 respectively). Similarity in Kamel A et al [16] study TG level was higher in diabetics than non-diabetics. (P value <0.05)

CONCLUSION:
Commonest modifiable risk factors in stroke are diabetes mellitus hypertension, smoking, dyslipidemia and alcohol consumption. Commonest non modifiable risk factors are increasing age, male sex and family history of stroke. Diabetes and dyslipidemia are an independent risk factor for stroke. Stroke in diabetes differs from that of stroke in non-diabetics with respect to age, sex, stroke type, stroke severity, prevalence of risk factors, and outcome. Early diagnosis, treatment including lifestyle modification and prevention of diabetes, dyslipidemia and other risk factors may reduce the development of stroke and its complications and it presents a major challenge for health care professionals facing an epidemic of both diabetes and stroke. Hyperglycemia at stroke onset is associated with higher risk of poor outcome independent of the other variables. Treatment or prevention of modifiable risk factors can reduce the mortality and morbidity of stroke.

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