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A DESCRIPTIVE CROSS-SECTIONAL RESEARCH TO ASSESS THE FREQUENCY OF HYPERGLYCEMIA IN ACUTE STROKE NON-DIABETIC PATIENTS

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Abstract:
Objective: To check out the incidences of hyperglycemia in non-diabetes patients suffering from a stroke.
Materials & Methods: This descriptive cross-sectional research completed at Service Hospital, Lahore in the timeframe from September 2016 to October 2017. A hundred and seventy-one subjects participated in the study whose ages were between (30 – 70) years. The subjects included both males and females. All the patients had diabetes mellitus and other diseases were not included in the study in the light of exclusion criteria. After taking a relevant history, a blood sample of each patient was drawn and sent to the pathology laboratory for measurement of blood glucose levels. The patients with the prevalence of hyperglycemia (blood sugar > 11.1 mmol/l) evaluated on the basis of laboratory results.
Results: The participants mean age was 53.82 years with a deviation of (±10.31) years. The sample composition in respect of gender was 89 males and 82 females. The male to female ratio was (1.1 to 1). The disease duration was (10.29 ± 6.53) hours and mean of Body Mass Index was (28.41) with a deviation of (±5.33) kg/m^2. The study delivered the prevalence of high blood glucose in 44 patients; whereas, no hyperglycemia case reported in the total of 127 patients.
Conclusion: The occurrence of hyperglycemia in non-diabetic stroke patients studied in this research was higher. The need is to exercise extreme care in such cases for timely identification and cure of hyperglycemia to minimize the mortality and morbidity rate associated with the disease.
Keywords: Stroke, ischemic, glucose, high.

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INTRODUCTION:

The stroke is a condition arising from improper blood supply to brain causing the brain to malfunction and often known as cerebrovascular accident (CVA) or cerebrovascular insult (CVI). The brain attack or malfunction can be due to reduced blood flow to the brain (ischemia) or loss of blood due to ruptured blood vessels (haemorrhage) [1]. Reduced brain blood flow can be due to blocked veins or hypoperfusion [2]. The haemorrhage stroke may be due to ruptured blood vessels or tissues [3]. Brain stroke is the second major reason for mortality among adults after ischemic heart diseases [5]. The infarction can lead to haemorrhage in 20-40% patients within a week time [6]. Diagnosing the type of stroke is vital as each type of stroke require a specific treatment which differs from other causes of the stroke. In this context, neuroimaging techniques have produced exceptionally good results for the diagnosis and management of stroke [8].

The stroke patients (ischemic in nature) administered with tissue Plasminogen Activator (tPA) which is the only approved drug by FDA. The tPA is effective within 3 hours of CVA [9]. Higher levels of blood glucose prevail in ischemic stroke patients which takes a few days to get back to standard values [10]. Almost 40-50% of patients suffering from stroke were already suffering from hyperglycemia. The patients who use thrombolytic agents were also the victims of high blood glucose in 20-30% cases. The prevalence of hyperglycemia in combination with other associated risk factors can lead to increase the mortality rate three times as compared to diabetic stroke patients in which the mortality rate was double in a month time period [11]. The use of thrombolytic agents causes blood glucose to increase significantly. The conversion of ischemic stroke to the hemorrhagic outcome is often due to the presence of hyperglycemia.

Despite other demographic variables like age, diabetic condition, status, and type of stroke, hyperglycemia alone can affect the mortality rate to increase and adversely affect the clinical results [12]. The prevalence of hyperglycemia in non-diabetic acute stroke patients affected by many factors. A study by Zahra F et al showed 20% patients suffering from a stroke who had hyperglycemia and were non-diabetic before the stroke attack [14].

The local literature does not have such material on the subject. In absence of such data, the study in hand will help to highlight the problems caused by the disease and to formulate the guidelines and procedures for early diagnosis and effective management of the problem in our set up.

Those patients are non-diabetic if their HbA1c level is less than 5.6% at the time of reporting and patients have no diabetes history.

Acute Stroke is defined by WHO as rapid and sudden indications usually occurring < 24 hours causing focal or global loss which might include weakness, disturbed speech, one-sided body malfunction, brain failure and senselessness without any explicit cause.

PATIENTS AND METHODS:

This descriptive cross-sectional research completed at Service Hospital, Lahore in the timeframe from September 2016 to October 2017. We included non-diabetic patients with an attack of stroke, age range between 30 to 70 years and of both genders. Whereas, we did not include non-diabetic patients with HbA1c >5.6%, diabetes Patients, patients who suffered from head injury, patients who were using thrombolytic agents or other drugs and patients with repeated attacks.

A total of 171 patients from both genders participated in the research. The sample composition was set according to the inclusion/exclusion criteria. Patients also provided the written consent for their willingness to participate in the research. Clinical results for BP, Body Mass Index and patients' history measured and recorded for each subject in light of operational definitions. The prevalence of hyperglycemia documented in case, if the blood glucose was greater than 11.1 mmol/l. We collected and entered the data on a pre-set form.

Statistical analysis completed through SPSS software. The variables presented in data also categorized and represented according to the types of variables i.e. mean, standard deviation and frequency. Stratification technique used for effect modifiers. After stratification, the Chi-square test used for evaluation of hyperglycemia and significant p-value (< 0.05).

RESULTS:

The patients' ages were in the range of (30 – 70) years with a mean value of 53.82 years. Most of the diagnosed patients were in the range of (51 – 60) years. The male to female ratio was (1.1 to 1) (89 males and 82 females). Table – II shows the stroke patients with associated diseases /complications. Mean BMI value was 28.41 and mean duration of disease was 10.29 hours.

The study confirmed hyperglycemia in 44 patients

and 127 patients were clear from hyperglycemia. Stratification results for hyperglycemia when seen against different age groups. The age group stratification was indifferent. Stratification in connection to gender was also indifferent. Different stratifications with respect to hyperglycemia, type and duration of disease etc. are available in tabular data.

Table – I: Age Distribution (171)

Age (Years)	Number	Percentage
30 - 40	23	13.45
41 - 50	44	25.73
51 - 60	53	30.99
61 - 70	51	29.82
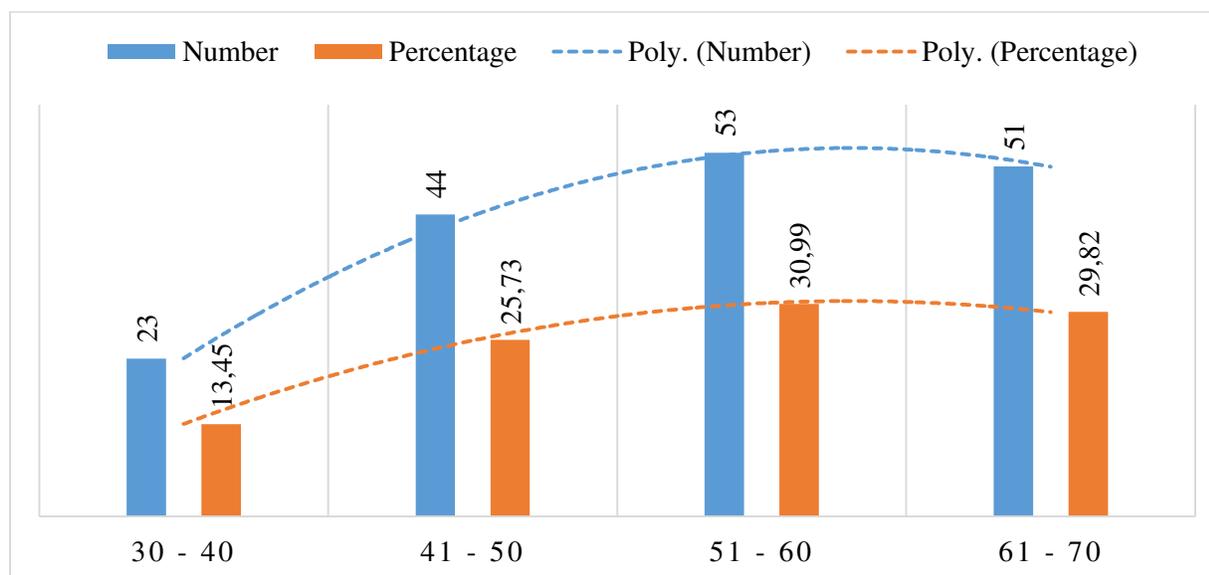
Table – II: Confounding Variables

Confounding variables		Number	Percentage
Smoking	Yes	73	42.69
	No	98	57.31
Hypertension	Yes	119	69.59
	No	52	30.41
Dyslipidemia	Yes	102	59.65
	No	69	40.35
BMI	Obese	88	51.46
	Non-obese	83	48.54
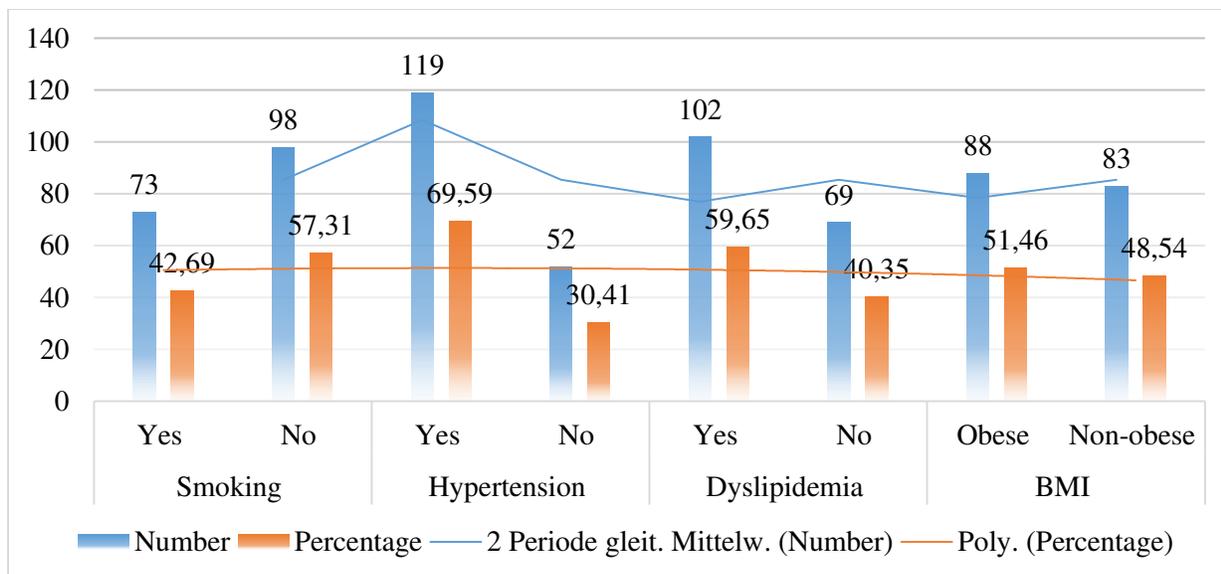
Table – III: Hyperglycemia Stratification with respect to Age

Age (Years)	Yes		No		P-Value
	Number	**Percentage**	**Number**	**Percentage**	
30 - 40	4	17.39	19	82.61	
41 - 50	13	29.55	31	70.45	0.686
51 - 60	15	28.30	38	71.70	
61 - 70	12	23.53	39	76.47	
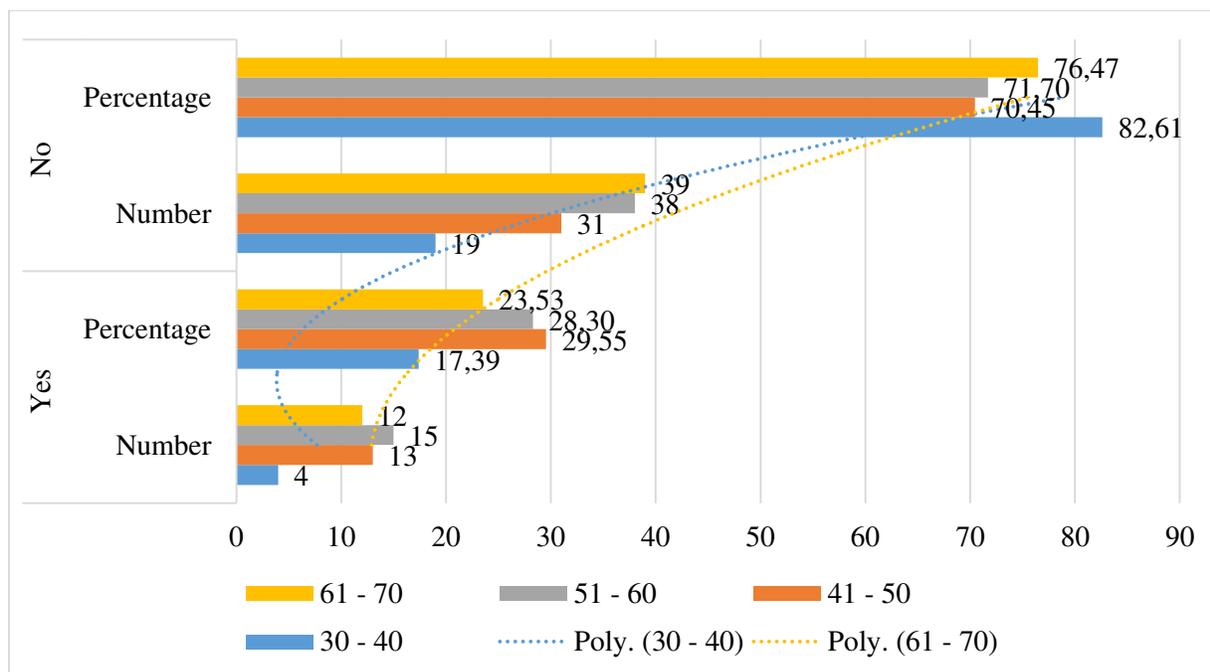
Table – IV: Stratification Analysis

Stratification		Yes		No		P-Value
		Number	Percentage	Number	Percentage	
Gender	Male	19	21.35	70	78.65	0.172
	Female	25	30.49	57	69.51	
Duration of disease (hours)	≤ 12 hours	25	22.73	85	77.27	0.228
	> 12 hours	19	31.15	42	68.85	
Type of Stroke	Hemorrhagic	24	25.81	69	74.19	0.980
	Ischemic	20	25.64	58	74.36	
Smoking	Yes	19	26.03	54	73.97	0.939
	No	25	25.51	73	74.49	
Hypertension	Yes	35	29.41	84	70.59	0.096
	No	9	17.31	43	82.69	
Dyslipidemia	Yes	30	29.41	72	70.59	0.181
	No	14	20.29	55	79.71	
BMI	Obese	24	27.27	64	72.73	0.635
	Non-obese	20	24.10	63	75.90	
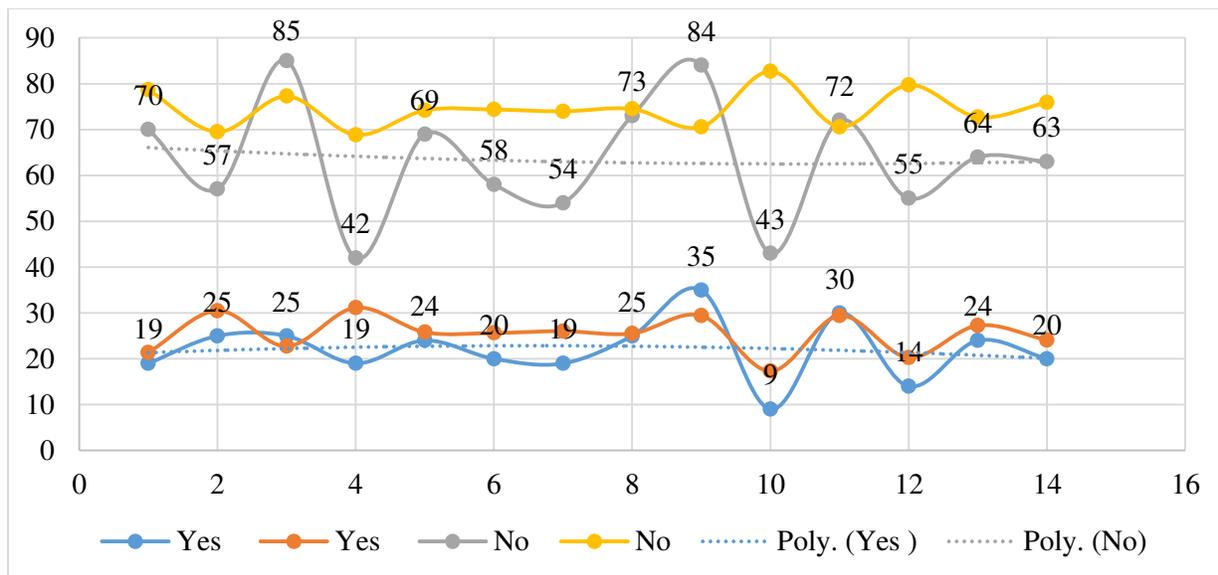
DISCUSSION:

The study confirmed the hyperglycemia in 44 patients and 127 patients were clear of hyperglycemia. A study showed that the risk of mortality increased in the non-diabetic acute stroke patients suffering from hyperglycemia. Almost 8-20% of patients had a previous history of Diabetes Mellitus (DM). The stroke patients with unidentified diabetes were 6-42%. Diabetes prevailed in 24.8% and hyperglycemia in 36.3% subjects [17]. Zahra F et al. delivered the prevalence of hyperglycemia in 20% of patients who were non-diabetic [14]. Moreover, he concluded that among non-diabetic subjects 58% were suffering from high blood glucose whereas 42% had hemorrhage.

The prevalence of hyperglycemia in stroke patients is relatively high (60%). The hyperglycemia tends to increase the risk of ischemic stroke [17]. Almost 20-40% of stroke patients had high blood glucose levels and they had not any diabetic diagnosis before the incidence [16].

Another GLIAS (Glycaemia in Acute Stroke) study aimed at exploring the false positive glucose levels among patients stated the cut point at 155 mg/dl. If the glucose level allowed to surpass this value during the forty-eight hours of the stroke incident the chance of mortality and incapacity increases. The GLIAS study found that it occurred unconventionally of the age, infarction or prevalence of diabetes [20]. Moreover, the hyperglycemia values were greater than 155 mg/dl in 40% of patients' in spite of the treatment. The stroke patients had not gone through diabetes screening previously [17]. The study delivered that the Asians are more likely to develop diabetes and hence should undergo the screening routine for hyperglycemia. A study by Van Kootenet et al. found that stress was not associated with increased blood glucose in non-diabetic stroke patients [23]. Another study by Tuomilehtoet et al. produced that 16% of stroke patients facing deaths were due to diabetes (33% in cases of females) [24]. The results did not support by a domestic study which found that no significant difference prevails in diabetic and non-diabetic patients in relation to final outcome [25].

CONCLUSION:

The occurrence of hyperglycemia in n0n-diabetic stroke patients studied in this research was higher. The need is to exercise extreme care in such cases for timely identification and cure of hyperglycemia to minimize the mortality and morbidity rate associated with the disease.

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