

# Study Comparing the Clinical Profile of Patients with Stroke in Diabetic and Non-Diabetic Patients

Stroke in Diabetic and Non-Diabetic Patients

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## ABSTRACT

**Objective:** To evaluate outcome pattern, clinical characteristics of stroke and to compare outcome pattern in diabetic and non-diabetic patients.

**Study Design:** Cross sectional study

**Place and Duration of Study:** This study was conducted at the department of medicine at DG Khan Medical College & Teaching Hospital, DG Khan and QAMC Bahawalpur from July, 2019 to June, 2020.

**Materials and Methods:** Sixty patients of stroke were enrolled in study and allocated in two groups on basis of their diabetic status (Yes/No). Patients were treated and diagnosed as per ward protocol. All patients of age >20 years presenting with findings of stroke hemi anesthesia, hemiparesis, vertigo, language dysfunction and altered sensorium were included. Main outcomes were infarct size, hemorrhage and prognosis. SPSS version 23 was used for data analysis. Test of significance were applied and p value less than or equal to 0.05 was taken as significant.

**Results:** The diabetes was noted in 60.0% patients. Infarct is the predominant pattern occurring in 58.3% patients and hemorrhage was observed in 56.6% patients. Good prognosis was noted in 45.0% patients and bad prognosis was observed in 55.0% patients. The difference was statistically significant between prognosis and diabetes status, (p=0.000).

**Conclusion:** Undoubtedly diabetes is risk factor for stroke that should be watched and considered. Pattern of outcomes and prognosis is much different in diabetic stroke patients as compare to non-diabetics

**Key Words:** Diabetes, Stroke, Hemorrhage, Infarct, Prognosis

**Citation of article:** Iqbal MZ, Ahmad A, Hussain S, Ahmad A. Study Comparing the Clinical Profile of Patients with Stroke in Diabetic and Non-Diabetic Patients. Med Forum 2021;32(6): 79-82.

## INTRODUCTION

Stroke is a medical illness that affects vessels lying within the brain or leading to the brain, it is the leading cause of disability in United States and many other countries<sup>1</sup>. It occurs because of blockage or rupture of arteries within brain that carries oxygen to certain parts of body. After this incidence part of brain cannot obtain blood supply or oxygen and as a result death of brain cells occurs<sup>2</sup>.

Routine investigations include random blood sugar, complete blood count, lipid profile, HbA1c, computed tomography, electrocardiogram and magnetic resonance imaging were performed for diagnosis of type of stroke<sup>3</sup>.

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Received: January, 2021

Accepted: February, 2021

Printed: June, 2021

Classification of stroke was done as ischemic and hemorrhagic. Furthermore, ischemic stroke divided as cortical, sub cortical, cerebellum and brainstem<sup>4</sup>. Worldwide about two million people suffered from diabetes mellitus. Recently diabetes mellitus has been declared as risk factor of stroke. Incidence ratio of stroke is three folds more in diabetic people as compare to non-diabetic<sup>5</sup>.

Stroke pattern is also much different in diabetic subjects as compare to non-diabetics<sup>6</sup>. A study was conducted on European diabetic population reported that diabetic patients most likely experience ischemic stroke about 77.5% in diabetic and 71.9% in non-diabetic. Similarly, incidence of hemorrhagic stroke was observed 85% in diabetic patients and 11.5% in non-diabetic patients<sup>7</sup>.

Different modified risk factors for stroke are diabetes mellitus, hypertension, cigarette smoking, hyperlipidemia, drug abuse, cardiac disease, AIDS and alcohol consumption<sup>8</sup>. Presence of ischemic heart disease along with hypertension is a strong predictor of ischemic stroke<sup>9</sup>. Similarly, in diabetic patient risk factors of stroke are smoking, age, male gender, high blood pressure and hyperglycemia. Role of diabetes as a risk factor for hemorrhagic stroke depends upon ethnicity and it is variables<sup>10</sup>.

According to Honolulu Heart program it was suggested that diabetes is not associated with hemorrhagic stroke among American and Japanese population<sup>11</sup>. It has been

reporting that diabetes is strongly associated with stroke and post stroke mortality rate. Although established fact of stroke and diabetes association but some studies observed significantly reduced incidence of transient ischemic attacks in non-diabetics as compare to non-diabetics<sup>12</sup>.

## MATERIALS AND METHODS

Study was conducted at department of medicine at DG Khan Medical College & Teaching Hospital, DG Khan/Quaid-e-Azam Medical College, (QAMC) Bahawalpur from 1<sup>ST</sup> July 2019 to 30<sup>th</sup> June 2020 in one-year duration. Study was started after ethical approval from hospital board and written informed consent from patients or their attendants. Non probability consecutive sampling technique was used.

All patients of age >20 years presenting with findings of stroke hemi anesthesia, hemiparesis, vertigo, language dysfunction and altered sensorium were included in study. Glucose metabolism of all patients was assessed. Patients with history of diabetes or random blood glucose >200 mg/dl were enrolled. Patients were enrolled in two groups on basis of their glucose status. Those patients having fasting glucose level >126 mg/dl treated with hypoglycemic agents or by insulin before stroke were included in diabetic group. Laboratory HbA1c was investigated. Patients presented with stroke but no history of diabetes were included in non-diabetic group.

Patients with history of head injury, use of steroids or anticoagulants before onset of stroke, stress hypoglycemia, elevated blood sugar at the time of stroke but normal HbA1c were excluded from study. Other risk factors like hypertension, dyslipidemia, smoking; ischemic heart disease and myocardial infarction were recorded.

Routine ward investigations like random blood glucose, complete blood count, fasting lipid profile, HbA1C computed tomography and magnetic resonance imaging were taken for identification of stroke. Type of stroke and its classification was done on basis of MRI and CT findings. Carotid Doppler ultrasound and echocardiography was done and noted.

SPSS version 23 was used for data analysis. Frequency percentages were calculated and presented for qualitative data like gender diabetic and non-diabetic patients. Mean and SD was calculated for continuous variables like age. Test of significance (t-test and chi square test) were applied to see association among variables.

## RESULTS

Sixty patients were included in our study with mean age 54.98±3.21 years. Majority of the patients were male, i.e. (65.0%), (Table. I). The diabetes was noted in (41.6%) patients. Infarct was predominant pattern occurring in (58.3%) patients. Hemorrhage was

observed in (56.6%) patients. The distribution of infarct and hemorrhage size versus diabetes chronicity was shown in table. 2.

Good prognosis was noted in (45.0%) patients and bad prognosis was observed in (55.0%) patients. The difference was statistically significant between prognosis and diabetes status, (p=0.000). (Table. 3).

**Table No.1: Age and gender distribution of the study patients**

Variable	Mean±S.D	N (%)
Age (years)	54.98±3.21	
<b>Gender</b>		
Male		33 (55.0)
Female		27 (45.0)

**Table No.2: Distribution of infarct and hemorrhage size in diabetes status versus diabetes chronicity**

	Small, N (%)	Medium, N (%)	Large, N (%)
<b>Infarcts</b>			
Diabetics	10 (28.6)	5 (14.3)	6 (17.1)
Non-diabetics	6 (17.1)	6 (17.1)	2 (5.7)
Total	35		
<b>Hemorrhage</b>			
Diabetics	12 (35.3)	10 (29.4)	2 (5.8)
Non-diabetics	7 (20.6)	2 (5.8)	1 (2.9)
Total	34		
<b>Infarct and hemorrhage size vs. diabetes chronicity</b>			
<b>Chronicity (in years)</b>			
<b>Infarcts (n=26)</b>			
<5	5 (19.2)	3 (11.5)	7 (26.9)
6-9	0 (0)	0 (0)	4 (15.38)
>10	1 (3.8)	0 (0)	6 (23.07)
<b>Hemorrhage (n=8)</b>			
<5	1 (12.5)	1 (12.5)	0 (0)
6-9	0 (0)	2 (25.0)	2 (25.0)
>10	0 (0)	1 (12.5)	1 (12.5)

**Table No.3: Brunnstroms staging in diabetes status and gender**

Variable		Prognosis		Test of sig.
		Good n=27 (45.0)	Bad n=23 (55.0%)	
Gender	Male	n=20 (51.3%)	n=19 (48.7%)	X <sup>2</sup> =1.77, d.f=1 p=183
	Female	n=7 (33.3%)	n=14 (66.7%)	
Diabetes status	Yes	n=10 (37.0%)	n=15 (65.2%)	X <sup>2</sup> =12.89, d.f=1 p=0.000
	No	n=17 (70.0%)	n=18 (34.8%)	

## DISCUSSION

Cerebrovascular accident or stroke is one of leading incident in this modern era that can cause significant mortality and morbidity in survived individuals<sup>13</sup>. Numerous studies and reports has been conducted to record outcome patterns of stroke in diabetic and non-diabetic patients. This study is planned to assess the outcome pattern, clinical characteristics and to compare outcome pattern in diabetic and non-diabetic patients.

A study was conducted by Kumar et al<sup>14</sup> on this topic and concluded that poor outcomes following stroke are much higher in diabetic patients as compare to non-diabetics. Results of this study were clinically significant as  $p=0.0001$ . Hemorrhagic incidents are higher in ratio among diabetics and risk increases with increase in chronicity. In contrast a study by Ali et al<sup>15</sup> reported that ischemic stroke is more common in diabetic patients.

Another similar study was conducted by Sarkar et al<sup>16</sup> and concluded that ischemic stroke, lacunar stroke and transient ischemic attack are more common in diabetic patients as compare to non-diabetic patients. In our study hemorrhagic stroke is observed in more cases in non-diabetics but less in diabetics. In this it was observed that stroke occurs in older age group. Similar findings were reported by Zafar et al<sup>17</sup> that stroke occurs in 59.5 years of age and in non-diabetic stroke observed in 60.4 years of age group.

Our findings contrasted by another study by Mulnier et al<sup>18</sup> who reported that stroke mostly observed in younger population and in female gender. General Practice Research Database was used for collection and analysis of data. Not only female gender but increase in age along female gender is more prone to stroke incident. Another study by Ho et al<sup>19</sup> also reported similar findings that female prevalence is reported more in national and international journals.

In our study we observed large infarct size in a small proportion of patients but small and medium proportion is found in higher proportion. Our study was contrasted by Kissela et al<sup>20</sup> who reported that large infarct size is common in stroke patients and hemorrhagic incident is smaller in proportion in diabetics. Air et al<sup>21</sup> also concluded that large infarct size along with ischemic stroke is common finding in diabetic patients. Ischemic stroke is less likely observed in non-diabetics.

In a study conducted by Jorgensen et al<sup>22</sup> reported that diabetes influence stroke patients in several ways, in onset, recovery, age and mortality. Increased glucose level at the time of stroke in non-diabetic patients is also a risk factor but in cases of diabetes it is riskier and fatal for human life. In another study by Stegmayr and Asplund<sup>23</sup> it was reported that transient ischemic attacks, ischemic heart disease and stroke are strongly associated with diabetic risk factor. Diabetic patients

are two time more prone to stroke incidence as compare to non-diabetic subjects.

Another study by Fritz et al<sup>24</sup> also reported similar findings that stroke is more common in diabetic peoples as compare to non-diabetic. Size of infarct and prognosis of stroke patients is also associated with diabetes mellitus.

## CONCLUSION

Undoubtedly diabetes is risk factor for stroke that should be watched and considered. Pattern of outcomes and prognosis is much different in diabetic stroke patients as compare to non-diabetics.

**Suggestions:** Community awareness programs based on risk factors of stroke and possible preventions of diabetic stroke like glycemic control and good compliance suggested.

### Author's Contribution:

Concept & Design of Study: Muhammad Zafar Iqbal  
 Drafting: Abrar Ahmad, Sajid Hussain  
 Data Analysis: Sajid Hussain and Ashfaq Ahmad  
 Revisiting Critically: Muhammad Zafar Iqbal, Abrar Ahmad  
 Final Approval of version: Muhammad Zafar Iqbal

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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