



Frequency of Acute Ischemic Stroke in Patient with Type-II Diabetes Mellitus: Descriptive Cross Sectional Study

Salman Khan^{1*}, Zubair Malik¹, Nisar Khan¹, Sajid Ali Mojai², Ata Ur Rehman³, Alamgir Khan⁴, Muhammad Ismail Khan⁵, Najeeb Ullah⁶, Hafiz Tahsin Ullah Jan⁷ and Tahseen Ahmed⁸

¹*Department of Medicines, Gomal Medical College, Dera Ismail Khan, Pakistan.*

²*Department of Pharmacy, Shah Abdul Latif University Khairpur Mirs, Sindh, Pakistan.*

³*Institute of Biological Sciences, Gomal University, Dera Ismail Khan, KPK, Pakistan.*

⁴*Department of Sports Science & Physical Education, University of Punjab, Lahore, Pakistan.*

⁵*Department of Zoology, Government post graduate college Bannu, KPK, Pakistan.*

⁶*Faculty of Agriculture, Gomal University, Dera Ismail Khan, KPK, Pakistan.*

⁷*Department of Pharmacy, KUST, Kohat, KPK, Pakistan.*

⁸*Institute of Pharmaceutical Sciences, Peoples University of Medical & Health Sciences, Shaheed Benazir Abad, Sindh, Pakistan.*

Authors' contributions

This work was carried out in collaboration among all authors. Author SK and AUR designed and supervised the study plan and performed all the experiment. Authors ZM and NK helped in writing of the manuscript. Author NK edited the manuscript and conducted the formal analysis. Author AUR performed the statistical analysis. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To evaluate the frequency of acute ischemic stroke in patients with type-II diabetes mellitus.

Study Design: Descriptive Cross sectional Study

Place & Duration of Study: The study was carried out at Department of Medicine, DHQ Teaching Hospital, Dera Ismail Khan for the period of 06 months from 06 Feb, 2018 to 06 Aug, 2018.

Methodology: All patients admitted through OPD presented with type-II diabetes mellitus and having acute ischemic stroke after radiological confirmation using non-contrast enhanced CT scan brain with type-II diabetes (as per operational definitions above) were enrolled in study. Informed written consent was taken by the researcher with detailed history followed by detailed clinical examination and all patients who gave their consent to participate in the study were questioned about their medical history and were examined in detail for their neurological deficits. All the laboratory investigations were done from single hospital laboratory and all the radiological investigations were done from hospital radiology department.

Results: As per frequencies and percentages for acute ischemic stroke, 215 (74.65%) patients were found having acute ischemic stroke.

Conclusion: In this study, we concluded that there is a significant age difference between the diabetes-stroke co-morbid patient and non-diabetic stroke patient. Therefore, health education on preventive measures for type 2 DM, adequate regulation of blood pressure and blood sugar level through compliance to medical advice and medication, regular clinic attendance and periodic measurement of blood pressure and blood sugar level.

Keywords: Diabetes mellitus; acute ischemic stroke; hypertension; blood sugar.

1. INTRODUCTION

Globally, Stroke is considered as the major cause of increased death rates and labeled as 5th main reason of modern world [1]. As per estimation and guidelines of WHO, at least 16.4 Million people of Stroke reported per year [2]. In United States of America, it is believed that stroke is the root cause of adult disability [3]. Similar types of incidents are reported in southern Asia and these are increasing day by day. This burning issue enhances the economic burden on the local resident of those particular areas. Affected people suffer more along with their families [4]. A community based study conducted in 2008-09 showed a 19.1% prevalence of stroke in Pakistan [5]. Stroke may be defined as symptoms associated with sudden death of cerebral cells in particular areas of brain due to shortage of blood, as cells are unable to get proper oxygen and nutrients. The symptoms appear very quickly [6]. Globally, the frequency of the patients of stroke are increasing due to randomly increased in the risk factors associated with Ischemic Stroke that may include as Hypertension, Obesity, Smoking, Dyslipidemia and Diabetes [7-8]. Stroke affects mainly old age group but studies have shown that stroke prevalence among young is up to 18% which is significant as far as Pakistan is considered because a large proportion of Pakistani population comprises of young adults [9-11]. Ischemic stroke constitute 75% [12] in the

diabetes-stroke co-morbid patients and 71.1% in the nondiabetic stroke patients, while hemorrhagic stroke constitute about 25% in the diabetes-stroke co-morbid patient and 28.9% in the non-diabetics stroke patients ($P = 0.540$) [12]. Type 2 diabetes being the most important modifiable risk factor as it contributes to both the hemorrhagic and ischemic stroke and is a common problem in young population [13,14]. Numerous people of Asia suffer from the disorder of Diabetes Mellitus in younger age as compared to different western population. Almost 15 million people got affected by cerebro-vascular disease around the globe with 5.7 dead casualties in Spain. Even many parameters had taken in order to overcome the complication of diseases but the numbers of cases were not known. This was quite relevant with the detail of epidemiology of CVD. Since last 30 years the cases of CVD were increased very fast and enhanced in the number of casualties due to ischemic heart diseases. As per data, it was noticed that Catalonia was also included in the same nature of cases of ischemic disease as there was no any related data available for estimation of CVD incidences. Special care along with proper management can reduce the chances of mortality among the local populations [14].

The complications of Diabetes Mellitus Type-II are more common among the Asian people rather than European communities [15]. The

characterization of clinical profile with accurate details of acute lacunar stroke among the adult patients can contribute the for better outcomes [16].

So the current research study was designed to evaluate the number of acute ischemic stroke among the patients reported with type-II Diabetes Mellitus. Technical diagnostic tools (Computerized Tomography) were used to detect the said disorder and confirmed through hypo-dense area.

2. MATERIALS AND METHODS

All participants admitted through OPD presented with type-II diabetes mellitus and having acute ischemic stroke after radiological confirmation using non-contrast enhanced CT scan brain with type-II diabetes were included in the current study. All the laboratory investigations were done from single hospital laboratory and all the radiological investigations were done from hospital radiology department. All the abovementioned information including name, age, gender and address was recorded in a pre-designed proforma, strict exclusion criteria was followed to control confounders and bias in the study results.

2.1 Data Analysis

Data was entered in Statistical Package for Social Science (SPSS) version 19. Mean and standard deviation was calculated for continuous variables like age. Frequency and percentages was presented for categorical variables like

gender, hypertension, smoking, dyslipidemia and acute ischemic stroke. Acute ischemic stroke was stratified among age, gender, hypertension, smoking and dyslipidemia to see effect modifications. Post stratification was applied through chi-square test by keeping P-value of <0.05 significant. All results was presented in the form of tables.

3. RESULTS AND DISCUSSION

This study was carried out on 288 patients at the Department of Medicine, DHQ Teaching Hospital, D.I Khan. Results are as follows:- As per age wise distribution, 88 (30.55%) patients were recorded in 50-60 years age group while 104 (36.11%) patients were recorded in 61-70 years group and 96 (33.33%) patients were recorded in 71-80 years. Mean and SD for age was recorded as 68 Years + 8.35 (Table 1). As per gender wise distribution, 190 (65.97%) patients were male whereas 98 (34.2%) patients were recorded female patients (Table 2). As per frequencies and percentages for acute ischemic stroke, 215 (74.65%) patients were found having acute ischemic stroke (Table 3). As per hypertension, 163 (56.59%) patients were found hypertensive whereas 125 (43.40%) were normotensive (Table 4). As per smoking, 163 (56.59%) patients were found with smoking history (Table 5). As per dyslipidemia, 170 (59.02%) patients were having dyslipidemia (Table 6). Stratification of acute ischemic stroke with respect to gender, age, hypertension, smoking and dyslipidemia is recorded at Tables 7 to 11 respectively.

Table. 1 Age Distribution of study subjects (n=288)

Age group	Frequency	Percentage
50-60 Years	88	30.55%
61-70 Years	104	36.11%
71-80 Years	96	33.33 %
Mean and SD for Age	68 Years + 8.35	

Table 2. Gender Distribution of study subjects (n=288)

Gender	Frequency	Percentage
MALE	190	65.97%
FEMALE	98	34.02%

Table 3. Acute ischemic stroke among study subjects (n=288)

Acute ischemic stroke	Frequency	Percentage
YES	215	74.65%
NO	73	25.34%

Table 4. History of Hypertension among study subjects(n=288)

Hypertension	Frequency	Percentage
Yes	163	56.59%
No	125	43.40%

Table 5. Smoking habits of study subjects (n=288)

Smoking	Frequency	Percentage
Yes	163	56.59%
No	125	43.40%

Table 6. Frequencies and percentages for dyslipidemia

Dyslipidemia	Frequency	Percentage
Yes	170	59.02%
No	118	40.97%

Table 7. Stratification of acute ischemic stroke with gender

Gender	Acute ischemic stroke	Frequency	Percentage	P value
Male	Yes	150	5.28%	0.019
	No	40	13.88%	
Female	Yes	65	22.56%	
	No	33	11.45%	

Table 8. Stratification of acute ischemic stroke with age

Age	Acute ischemic stroke	Frequency	Percentage	P value
50-60 Years	Yes	54	18.75%	0.000028
	No	34	11.80%	
60-70 Years	Yes	93	32.29%	
	No	11	3.81%	
71-80 Years	Yes	68	23.61%	
	No	28	9.72%	

Table 9. Stratification of acute ischemic stroke with hypertension` (n=288)

Hypertension	Acute ischemic stroke	Frequency	Percentage	P value
Hypertensive	Yes	127	44.09%	0.146
	No	36	12.5%	
Normotensive	Yes	88	30.55%	
	No	37	12.84%	

Table 10.Stratification of acute ischemic stroke with smoking

Smoking	Acute ischemic stroke	Frequency	Percentage	P value
Smoker	Yes	126	43.75%	0.238
	No	37	12.84%	
Non Smoker	Yes	89	30.90%	
	No	36	12.5%	

Table11. Stratification of acute ischemic stroke with dyslipidemia

Dyslipidemia	Acute ischemic stroke	Frequency	Percentage	P value
Dyslipidemia	Yes	128	44.44%	0.763
	No	42	14.58%	
No Dyslipidemia	Yes	87	30.20%	
	No	31	10.76%	

4. DISCUSSION

It was found that stroke patients constituted 1.1% of total hospital admissions and about 9.9% of total medical admissions; this finding is similar to what was obtained by Abubakar et al. [17] at the same institution, Ojini and Danesi [18] at Lagos University Teaching Hospital, Oni et al. [19] at the Niger Delta University Teaching Hospital, Ammassoma in Bayelsa State. Stroke constituted about 2.8% of the total medically related death within the study period. This is similar to report from other studies [5,17]. About 74% of the total stroke patients had diabetes ($P = 0.645$) which as compared to my study where 215 (74.65%) patients had acute ischemic stroke. This is similar with reports from other studies in Africa but lower than studies from the developed world [5,17]. The mean age of the diabetic group (68 ± 8.35 years) this was similar to what was obtained by Karapanayiotides et al. [20] ($P < 0.001$) but was higher than what was obtained by Zafar et al. [21] who showed that there is no difference between the diabetic and nondiabetic groups ($P = 1.00$) and Jørgensen et al. [22] who showed that diabetic stroke patients were 3.2 years younger than the nondiabetic stroke patient ($P < 0.001$). It was also observed that the incidence of the stroke increased with age and the peak incidence for male and female in the diabetes-stroke co-morbid patient was in the seventh and eighth decades, respectively, and for the non-diabetes-stroke patient, the peak incidence for male and female was in the sixth and seventh decades, respectively, thus peak incidence of stroke tends to be higher among the diabetes-stroke co-morbid group of patient than the nondiabetic group.

The peak incidence of a stroke patient regardless of presence or absence of diabetes was seen in the sixth and seventh decades for males and females, respectively. This finding is similar to what was obtained by Oni et al. [23] However, differ in peak incidence for female.

In this study, there is no significant difference between the sexes of both the diabetes-stroke co-morbidity group and the nondiabetics stroke

group ($P = 0.548$, $X^2 = 0.400$). This correlate with the findings of Wagenknecht et al.[18] It was found that there is no significant difference in occurrence of stroke risk factors such as hypertension, mini-stroke, heart disease, and smoking of cigarette between the diabetes-stroke co-morbid group and the nondiabetics stroke group (83.3% vs. 78.9% $P = 0.537$ for hypertension, 8.3% vs. 10.5% $P = 0.645$ for mini-stroke, 8.3% vs. 7.9% $P = 0.656$ for heart disease, 8.3% vs. 9.2% $P = 0.701$ for smoking of cigarette) this is similar to what was obtained by Zafar et al. [25] but contrast other studies. [26] difference observe may be probably due to relative high prevalence of such risk factors in the study environment. The mean of the random blood sugar level of the diabetes-stroke comorbid patients (mean = 8.63 ± 3.38) at presentation tends to be higher than in the nondiabetic stroke group of patients (mean = 7.23 ± 1.68) though the difference was not statistically significant ($t = 1.621$, $P = 0.115$). This contrast what was obtained by Hamidon and Raymond [28] who show that there is strong positive association between admission blood glucose and DM. Ischemic stroke tends to occur more frequent in the diabetes-stroke co-morbid group than in the non-diabetic group (75% vs. 71.1%) which as compared to my study where 215 (74.65%) patients had acute ischemic stroke. Stroke is the leading cause of mortality worldwide and fifth most common cause in industrialized world [1]. According to World Health Organization (WHO) estimates, there are globally 16.3 million new stroke events each year [2]. It is the most common cause of adult disability in the United States [27]. The incidence of stroke is increasing in Asia and is responsible for significant economic burden and is having a devastating impact on patients, their families and cares [4]. A community based study conducted in 2008-09 showed a 19.1% prevalence of stroke in Pakistan [5]. Stroke is defined as a syndrome of rapid onset of cerebral deficit, usually focal, lasting more than 24 hour or leading to death with no apparent cause other than a vascular one [6]. The burden of ischemic stroke is increasing worldwide because of the rise in the major risk factor for ischemic stroke i.e.hypertension,

diabetes, obesity, smoking and dyslipidemia [7-8]. Stroke affects mainly old age group but studies have shown that stroke prevalence among young is up to 18% which is significant as far as Pakistan is considered because a large proportion of Pakistani population comprises of young adults [9-11]. Ischemic stroke constitute 75% [28] in the diabetes-stroke co-morbid patients and 71.1% in the nondiabetic stroke patients, while hemorrhagic stroke constitute about 25% in the diabetes-stroke co-morbid patient and 28.9% in the nondiabetics stroke patients ($P = 0.540$) [12] which as compared to my study where acute ischemic stroke in diabetics patients were recorded in 215 (74.65%). Type2 diabetes being the most important modifiable risk factor as it contributes to both the hemorrhagic and ischemic stroke and is a common problem in young population [13-14]. Diabetes develops at a younger age in Asian populations than in white populations and its complications are also common in young Asian people [15]. Insulin resistance is the underlying defect in > 90% of patients with type 2 diabetes mellitus. Type 2 diabetes patients have both an increased susceptibility to atherosclerosis and an increased prevalence of atherogenic risk factors, notably hypertension, obesity, and abnormal blood lipids that contributes to stroke incidence [16,29]. Diabetes guidelines recommend aggressive screening for type 2 diabetes mellitus in Asian patients as they are considered to have a higher risk of developing diabetes and potentially worse prognosis [29]. Current guidelines also recommend screening patients for diabetes if they have 1 or more risk factors for diabetes for e.g. age > 45 years, hypertension, lipid abnormalities, vascular disease [24]. the study was carried out by Arboix et al on the impact of female gender with prognosis in Type-II diabetes with ischemic stroke and it was noticed that females were more prone to wards severity of disease in ischemic stroke, if they had prognosis of diabetes type-II and it resembles with the current study as it also enforces the co-morbidities of the ischemic stroke on the selected genders [17].

5. CONCLUSION

In this study, we concluded there is a significant age difference between the diabetes-stroke co-morbid patient and non-diabetic stroke patient. Therefore, health education on preventive measures for type 2 DM, adequate regulation of blood pressure and blood sugar level through compliance to medical advice and medication,

regular clinic attendance and periodic measurement of blood pressure and blood sugar level.

CONSENT

Informed written consent was taken by the researcher with detailed history followed by detailed clinical examination and all patients who will give their consent to participate in the study was questioned about their medical history and was examined in detail for their neurological deficits.

ETHICAL APPROVAL

Prior the start of study a letter from the Ethical Committee of concern hospital was granted. This study was conducted according to the guidelines approved by ethical board of the Gomal Medical College, Dera Ismail.Khan.

AVAILABILITY OF DATA AND MATERIALS

It can be obtained from the corresponding author on request.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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