

INCIDENCE OF ISCHEMIC STROKE IN TYPE 2 DIABETES MELLITUS PATIENTS AT CHANDKA MEDICAL COLLEGE HOSPITAL LARKANA

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Dr. Saad Ali**Abstract****OBJECTIVE**

To evaluate the frequency of ischemic stroke in type II diabetes mellitus patients at Chandka Medical College Hospital Larkana

METHODOLOGY

A descriptive cross-sectional study was carried out in the Department of General Medicine, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, between May 2023 and December 2024, following ethical approval and informed consent. Using a non-probability consecutive sampling approach, 159 adults aged 40–80 years with type 2 diabetes mellitus were enrolled. Data was obtained through interviews, detailed clinical evaluations, and neuroimaging. Statistical analysis was conducted using SPSS version 26, employing Chi-square tests with $p < 0.05$ considered significant.

RESULTS

The frequency of ischaemic stroke in Type 2 Diabetes Mellitus was noted as 27.7%. The sample comprised 86 males (54.1%) and 73 females (45.9%), with the mean age of 56.79 ± 13.07 years. The statistically insignificant association was noted between the age ($p=0.953$), gender ($p=0.519$), BMI ($p=0.853$), the duration of diabetes ($p=0.875$), hypertension ($p=0.973$) and smoking ($p=0.754$) and stroke.

CONCLUSION

The study indicated that ischaemia stroke was significant among individuals with Type 2 Diabetes Mellitus. No significant associations were observed between stroke occurrence and demographic and clinical parameters. The results suggest that there exists a continued necessity to identify patients at elevated risk at the earliest opportunity and to implement preventive measures proactively in order to mitigate the incidence of stroke among individuals with diabetes.

INTRODUCTION

Diabetes mellitus and stroke are two of the most prominent health issues in the world, and they are major contributors to morbidity and mortality in the world [1]. Lifetime risk of stroke keeps on

both rising and the causes are aging of the population and the rising burden of metabolic disorders [2]. One of the most significant and well-known risk factors of ischemic stroke is Type

2 Diabetes Mellitus (T2DM) among these conditions [3-6]. Patients with T2DM are approximated to stand a two to six-fold higher risk of getting ischemic stroke as compared to individuals devoid of diabetes [4,6]. This heightened susceptibility is consistently documented across various demographic groups and is particularly accentuated in younger populations as well as in individuals who exhibit concomitant hypertension or vascular disorders [4].

The link between T2DM and ischemic stroke is complex and multifactorial. This association is caused by a number of interrelated pathophysiological processes such as endothelial dysfunction, chronic inflammation, oxidative stress, and dyslipidaemia that lead to a prothrombotic and atherosclerotic vascular condition [7]. Persistent hyperglycaemia is one of the leading factors in causing structural and functional vascular injury of the cerebral vessels, increasing the risk and severity of stroke [4]. This leads to the conclusion that the poorer outcomes of T2DM patients who experience acute ischemic stroke are more likely to die or experience more disability and unfavourable response to interventions such as intravenous thrombolysis [4,8]. With the increasing rate of diabetes all over the world, the effects of this comorbidity on the cerebrovascular health have turned out to be a burning issue of societal health. Recent past global studies have indicated progressive increase in the burden of ischemic stroke and a foreseen subsequent increase in the incidence during the coming few decades [9]. The amount of enlightenment of the patients with T2DM on the occurrence and risk factors of ischemic stroke will help to improve the prevention and management interventions. The rationale of the proposed study is to define the incidence of ischemic stroke among the patients with Type 2 Diabetes Mellitus. The study is important to ascertain the current burden of the disease posed by diabetes, make health policy decisions, and enable the development of particular actions to stem this growing social issue.

METHODOLOGY

A comprehensive cross-sectional investigation was executed within the Department of General Medicine at Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, spanning the period from May 2023 to December 2024. Prior to the commencement of the study, ethical clearance was secured from both the Institutional Review Board and the Ethical Review Committee. Informed consent in written form was secured from all participants subsequent to the elucidation of the study's objectives, methodologies, as well as the associated risks and benefits. The participants of the study were adult patients aged between 40-80 years with the confirmed diagnosis of type 2 diabetes mellitus with at least one year of duration. Ischemic stroke was considered to be the focal neurological deficit that remains over 24 hours and is confirmed by computed tomography that indicates a non-dense area that is characteristic of cerebral infarction. Diabetes mellitus was identified by the presence of medical history and the current use of anti-diabetic medication. A total of 159 eligible participants were selected through a non-probability consecutive sampling method.

Patients with known malignancies, chronic renal or hepatic failure, transient ischemic attacks, seizure disorders, peripheral neuropathies, pregnant and lactating women were excluded from the study. The principal investigator used institutional guidelines to collect the data through structured interviews and thorough clinical assessment. The age, body mass index, height, weight, demographic and anthropometric data was collected in a designed data form. Neuroimaging techniques were employed on all subjects to ascertain the existence or non-existence of ischemic cerebrovascular accidents. The collected data were securely archived and were restricted to access solely by the research personnel. Statistical analysis was performed using SPSS version 26. Descriptive statistics summarized demographic and clinical characteristics, while associations with ischemic stroke were analyzed using the Chi-square test, with a significance level set at $p < 0.05$.

RESULTS

In this study, a total of 159 individuals diagnosed with type 2 diabetes mellitus were included. The average age of participants was 56.79 ± 13.07 years (95% CI: 54.74–58.84). The BMI was recorded as 25.32 ± 5.18 kg/m² (95% CI: 24.51–26.13), while the average duration of diabetes among participants was 7.64 ± 1.97 years (95% CI: 7.33–7.95).

In gender distribution, 76 participants (47.8%) were male and 83 (52.2%) were female, suggesting a modest predominance of female participants in the sample. In terms of residential background, the majority of patients, 92 (57.9%), resided in urban areas, whereas 67 (42.1%) were from rural settings. Among the study population, 69 participants (43.4%) had coexisting hypertension, and 23 (14.5%) reported being current or recent smokers. The detailed baseline demographic and clinical profile of the study population is presented in Table I.

The comparison of baseline demographic and clinical variables between patients with type II DM who experienced ischemic stroke ($n = 44$) and those without ischemic stroke ($n=115$) is presented in Table II.

The mean age of patients with ischemic stroke was 56.79 ± 13.07 years, which was comparable to 57.01 ± 13.13 years among those without stroke ($p = 0.737$). Similarly, there was no statistically significant difference in the mean duration of diabetes, which was 7.68 ± 1.66 years in the ischemic stroke group and 7.63 ± 2.09 years in the non-stroke group ($p=0.874$). The mean BMI did not differ significantly between the two groups (25.43 ± 4.89 kg/m² vs. 25.28 ± 5.30 kg/m², $p=0.868$).

Regarding gender distribution, males comprised 30.3% of the ischemic stroke group and 69.7% of the non-stroke group, while females accounted for 25.3% and 74.7%, respectively, showing no significant association between gender and stroke occurrence ($p = 0.485$). In terms of residential status, 21 (22.8%) of the stroke patients resided in urban areas compared to 71 (77.2%) in the non-stroke group, whereas 23 (34.4%) stroke patients were from rural areas versus 44 (65.7%)

without stroke; this difference was not statistically significant ($p=0.109$).

The prevalence of hypertension was 27.5% among patients with ischemic stroke and 72.5% among those without, with no significant difference observed ($p=0.973$). Similarly, smoking status did not differ significantly between groups, with 7 (30.4%) smokers in the ischemic stroke group and 16 (69.6%) in the non-stroke group ($p=0.749$).

DISCUSSION

T2DM is also considered a significant independent risk factor of ischemic stroke worldwide. The risk of ischemic stroke in people with diabetes is estimated as two- to sixfold in comparison with people without diabetes, and this observation indicates that the burden of cerebrovascular complications in people with T2DM is considerable and that more prophylactic strategies and timely risk evaluation initiatives are necessary [1]. This increased risk has been identified to be constant among different populations and increase to significant levels in younger patients and those who have other comorbidities such as hypertension or other vascular diseases. Diabetes has also been shown by several studies to be a leading cause of stroke, stroke severity, and stroke mortality, further showing its effects on the public health [3-4]. Moreover, longer duration of disease and ineffective glycaemic control increase the risk of ischemic stroke [5-6].

The study conducted among patients with and without ischemic stroke did not show any statistically significant association in mean age, period of diabetes and body mass index. The mean age of stroke patients was 56.79 years, which was comparable to 57.01 years among those without stroke. Similarly, no significant difference was found between groups regarding the length of diabetes and body mass index. Such findings are in contrast to another study that found age, obesity and the length of diabetes as major predictors of stroke [7,8]. The observed variation may be attributable to the comparatively uniform characteristics of the sample, the restricted sample size, or the cross-sectional

research design, which is incapable of establishing temporal relationships.

Gender distribution also did not differ significantly between stroke and non-stroke groups, with males accounting for 30.3% and females 25.3% of stroke cases. Though, previous research indicated a slightly increased relative risk of stroke in diabetic women [9], we can say that gender might not be a determining factor in this cohort. Similarly, no correlation was found between residential status and stroke, which could indicate the same lifestyle behaviors and access to healthcare among urban and rural residents.

Hypertension and smoking, both established modifiable risk factors for ischemic stroke, also did not show statistically significant associations with stroke in this study. Hypertension has been repeatedly confirmed as a major predictor of stroke, particularly in diabetic individuals [3,5], and smoking has been shown to accelerate atherosclerotic and prothrombotic processes that predispose to ischemic events [4]. This lack of statistical significance could be explained by the ubiquitous presence of the said risk factors throughout the entire group of diabetic patients, and, therefore, the lack of their relative impact. These same results have been experienced in epidemiological studies in which there has been a high initial prevalence of hypertension in diabetic subjects and tobacco use which limited their ability to distinguish results [10,11]. The aetiology of the pathophysiological interplay between T2DM and ischemic stroke is complicated and multifactorial. The continued occurrence of hyperglycaemia leads to endothelial dysfunction, oxidative stress and chronic inflammation which form a prothrombotic and atherosclerotic vascular condition [4].

These metabolic disturbances increase both the risk and severity of ischemic events [12]. In addition, insulin resistance and cardiovascular autonomic dysfunction further aggravate vascular injury, predisposing diabetic patients to cerebrovascular complications [2,13]. Findings from predictive modelling studies have shown that poor glycaemic control and specific metabolic profiles increase the likelihood of

ischemic stroke in diabetic patients [9,11]. Furthermore, South Asian populations, including Pakistan, demonstrate a higher prevalence of diabetes and central obesity, which together increase the risk of ischemic stroke [14]. Effective prevention and management strategies that emphasize optimal glucose control and treatment of comorbidities are therefore essential to reduce this burden [15].

A key strength of this study is that ischemic stroke was confirmed using neuroimaging, which ensured diagnostic accuracy. The study also provides valuable local data from a region where limited epidemiological research exists on the diabetes-stroke association. However, several limitations should be considered. The cross-sectional design precludes causal inference, a limitation also noted in earlier observational studies [7,8]. This might be due to the small sample size that might have restricted the extent of identifying minor differences. Moreover, the potentially important variables, such as lipid profiles, glycated haemoglobin, medication adherence were not evaluated, and this may be one of the critical risk factors of stroke [9,10]. Also, the use of non-probability consecutive sampling technique can further reduce the external validity of the results to other populations since the method of sampling has its set limitations.

Despite these limitations, the study provides useful regional statistics on the relationship between T2DM and ischemic stroke. These results underscore the importance of good glycaemic control, managing the cardiovascular risks in time and population-based programs implementation as a measure to reduce the burden of the cerebrovascular disease among diabetics. It is recommended that larger and multicentre longitudinal studies be conducted to confirm these findings and also shed more light on the causal pathways.

CONCLUSION

The study indicated that ischaemia stroke was significant among individuals with Type 2 Diabetes Mellitus. No significant associations were observed between stroke occurrence and

demographic and clinical parameters. The results suggest that there exists a continued necessity to identify patients at elevated risk at the earliest opportunity and to implement preventive

measures proactively in order to mitigate the incidence of stroke among individuals with diabetes.

Table I: Baseline demographic & clinical characteristics of patients with Type 2 Diabetes Mellitus (n = 159)

Mean ± Standard Deviation		95% Confidence Interval
Age in years = 56.79 ± 13.07		54.74~58.84
Body Mass Index in kg/m ² = 25.32 ± 5.18		24.51~26.13
Duration of diabetes in years = 7.64 ± 1.97		7.33~7.95
Frequency (%)		
Gender	Male	76 (47.8)
	Female	83 (52.2)
Residential Status	Urban	92 (57.9)
	Rural	67 (42.1)
Hypertension		69 (43.4)
Smoking Status		23 (14.5)

Table II: Comparison of baseline characteristics between diabetic patients with and without ischaemic stroke (n = 159)

Baseline Characteristics		Ischemic Stroke		95% Confidence Interval	P-Value
		Yes (n=44)	No (n=115)		
Age		56.79 ± 13.07	57.01 ± 13.13	5.372~3.809	0.737
Duration of diabetes in years		25.43 ± 4.89	25.28 ± 5.30	1.666~1.973	0.868
Duration of diabetes in years		7.68 ± 1.66	7.63 ± 2.09	0.639~0.751	0.874
Gender	Male	23 (30.3)	53 (69.7)	0.639~2.570	0.485
	Female	21 (25.3)	62 (74.7)		
Residential Status	Urban	21 (22.8)	71 (77.2)	0.281~1.141	0.109
	Rural	23 (34.4)	44 (65.7)		
Hypertension		19 (27.5)	50 (72.5)	0.490~1.992	0.973
Smoking Status		7 (30.4)	16 (69.6)	0.446~3.073	0.749*

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