



Frequency of Newly Diagnosed Diabetes Mellitus in Acute Ischemic Stroke Patients

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ABSTRACT

Background: Diabetes mellitus is a major risk factor for ischemic stroke and is often undiagnosed until complications arise. Early identification of previously unrecognized diabetes in stroke patients is essential for improving clinical outcomes and preventing recurrence. **Objective:** To determine the frequency of newly diagnosed diabetes mellitus in patients presenting with acute ischemic stroke. **Methodology:** The study was a cross-sectional research undertaken in the Department of Medicine, Lady Reading Hospital, Peshawar in July 22, 2024-January 22, 2025. Non-probability consecutive sampling was used to enroll 150 patients with the established acute ischemic stroke. Patients who had a history of diabetes were not included. Fasting blood glucose levels and HbA1c levels were measured and blood samples were collected. New diagnosis of diabetes mellitus was fasting plasma glucose 126mg/dL or HbA1c 6.5%. Data analysis was done through the SPSS version 26. **Results:** The mean age of patients was 61.4 ± 11.2 years, with 61.3% males and 38.7% females. Also, 46 (30.7) patients and 104 (69.3) patients were non-diabetic and newly diagnosed with diabetes mellitus, respectively. Males and patients aged ≥ 60 years had a higher rate; but the relationships were not statistically significant. **Conclusion:** Acute ischemic stroke patients with pre-existing diabetes mellitus is found in a significant population. Regular examination of diabetes amongst stroke patients is highly encouraged to enhance correct diagnosis, proper management, and better clinical results

INTRODUCTION

Stroke is a significant global cause of morbidity and mortality and is a significant determinant of health, especially in developing nations (Pandian et al., 2020; Owolabi et al., 2022; Aguirre et al., 2023). Ischemic stroke, which is a form of stroke, is estimated to make up 70-85% of all strokes, and is caused by a blood flow blockage to the brain leading to the death of brain cells and loss of neurological abilities (Barthels, 2020; Murphy, 2020; Salaudeen, 2024). Stroke is the second cause of death and a major cause of long term disability in the world globally according to the world health organization, which poses a huge burden on healthcare systems and economies (Feigin et al., 2022; Khandelwal and Gupta, 2023).

Diabetes mellitus is known to be a high-risk factor predisposing ischemic stroke and it is linked to a worse prognosis (Maida et al., 2022; Mosenzon et al., 2023). It is a chronic metabolic condition when insulin secretion, or insulin action or both are defective and cause the persistent hyperglycemia (Jadon et al., 2024). Diabetes worldwide has increased tremendously in the recent decades. According to the International Diabetes

Federation estimates, hundreds of millions of adults are living with diabetes now, and a large fractions of these adults have not been diagnosed with this illness, including in the developing world, like Pakistan (Ogurtsova et al., 2022). The population not diagnosed is at a high risk of contracting complications, such as cardiovascular and cerebrovascular illnesses.

There are complex and multifactorial links between diabetes and ischemic stroke (Zhao et al., 2024; Wolf et al., 2022; Sacco et al., 2024). Chronic hyperglycemia causes endothelial dysfunction, oxidative stress, inflammation, and accelerated atherosclerosis and contributes to vascular damage and vulnerability to ischemic events (Gonza et al., 2023; An et al., 2023; Janjusevic et al., 2022). Research, like that of the Emerging Risk Factors Collaboration, has shown that diabetic persons are about twice as likely to suffer ischemic stroke compared to non-diabetic persons (Kvitkina et al., 2023). Moreover, hyperglycemia during stroke has been revealed to exacerbate results by enhancing the size of infarcts, facilitating blood-brain barrier injury, and affecting reperfusion (Ferrari et al., 2022).

The most relevant but less frequently addressed one is the occurrence of an undiagnosed diabetes in the patients submitted with an acute ischemic stroke (Johansen, 2023; Saceleanu et al., 2023). A significant portion of the people are not symptomatic until the later stages of diabetes and are only identified at the stage when they become comorbid (Mekala & Bertoni, 2020). An acute disease, like stroke, can reveal previously undiagnosed hyperglycemia, in which case it is considered a form of undiagnosed diabetes or in which case it is stress-related hyperglycemia (Yao et al., 2023). According to a study by Lindsberg and Roine, a high percentage of patients with stroke who has never experienced diabetes prior to the stroke have higher glucose levels in their blood at admission, and this can indicate underlying disturbances in the metabolism (Yoon et al., 2021).

Learning about new cases of diabetes in stroke patients early is very important because of a number of reasons (Maida et al., 2022). To begin with, it enables quick glyceamic regulation, which could enhance neurological outcome and decrease the likelihood of complications. Secondly, it gives a chance of the secondary prevention plans such as lifestyle alteration and pharmacological solutions, which can diminish recurrent stroke risks (Liu et al., 2024). Guidelines The American Diabetes Association suggests screening diabetic hyperglycemic patients in hospitals regularly, especially in those suffering cardiovascular incidents, to facilitate a prompt diagnosis and treatment (Dhatariya & Umpierrez, 2024).

Unlike in the West, where the consequences of non-communicable pathologies are becoming more widespread in the world, in Pakistan, the burden of both stroke and diabetes is rapidly growing due to urbanization, sedentary lifestyle, and change in diet (Feigin et al., 2022; Mekala & Bertoni, 2020). Nonetheless, scanty local statistics is available about the incidence of newly diagnosed diabetes among patients with acute ischemic stroke. The available studies are mainly done in developed countries and their results may not be directly applicable to the local population since they differ in genetics, access to health care and risk factor profile. Thus, to gain a deeper insight into the scale of the issue and shape clinical practice, it is vital to create region-specific data since in low- and middle-income areas, the cause and consequences of stroke and diabetes are increasing at an increased pace (Pandian et al., 2020; Kvitkina et al., 2023).

The given research will establish the prevalence of newly-diagnosed DM in patients with acute ischemic stroke in a tertiary care facility in Peshawar. This study aims to indicate the need to screen patients regularly and at the earliest opportunity, to facilitate the management of patients with little to no knowledge about diabetes and to lessen the impact of complications caused by stroke.

METHODOLOGY

This cross-sectional study in a hospital was carried out in the Department of Medicine, Lady Reading Hospital, Peshawar, between January 22, 2024 and July 22, 2025. The objective of the study was to ascertain the rate of newly diagnosed diabetes mellitus among patients with acute ischemic stroke presenting. A non-probability

consecutive sampling method was used to include a total of patients who were admitted and had a clinical and radiological diagnosis of acute ischemic stroke. Both male and female patients aged 18 years or older were recruited with the exclusion of patients with a known history of diabetes mellitus, hemorrhagic stroke or transient ischemic attacks and severe comorbid conditions.

Upon informed consent, the detailed demographic and clinical information was documented with the help of a structured pro forma. The clinical evaluation and neuroimaging test was done, including CT scan or MRI, as a means of diagnosing the acute ischemic stroke. All the included patients had blood taken to test the level of fasting blood glucose and HbA1c. The newly diagnosed diabetes mellitus criteria were based on normal diagnostic criteria (fasting plasma glucose 126 mg/dL or of HbA1c 6.5% or higher) in patients who never had diabetes.

All the data collected were analyzed and fed into the Statistical Package for Social Sciences (SPSS) version 26. Quantitative variables (like age and blood glucose) were expressed with mean and standard deviation where as qualitative variables (like gender and frequency of recent diagnosis of diabetes mellitus) were presented in terms of frequencies and percentages. Stratification was undertaken to correct modifying effects like age, and sex. It used post-stratification chi -square test and a p-value of 0.05 was declared significant statistically.

RESULTS

In this study, 150 patients with acute ischemic stroke were used. The average age of the patients was $61.4/11.2 = 61.4$ years; the patients were between 38 and 85 years old. Among the participants, 92 (61.3%) were male and 58 (38.7%) were female.

Amongst the entire patients, 46 (30.7) were newly diagnosed with diabetes mellitus through the levels of fasting blood glucose and HbA1c and 104 (69.3) had no traces of diabetes.

Stratification of diabetics newly diagnosed with diabetes mellitus with respect to gender revealed that 30(32.6) males and 16(27.6) females were newly diagnosed diabetics. But this was not found to be statistically significant ($p = 0.48$).

Likewise, stratification by age showed that patients with newly diagnosed diabetes mellitus were more common in patients who weighed 60 years and older than younger ($p = 0.09$).

Table 1
Demographic Characteristics of Patients (n = 150)

Variable	Frequency (n)	Percentage (%)
Age (years)		
< 60	64	42.7%
≥ 60	86	57.3%
Gender		
Male	92	61.3%
Female	58	38.7%

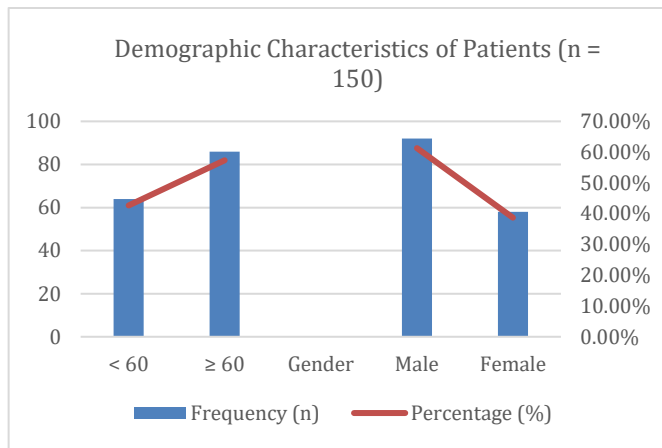


Table 2
Frequency of Newly Diagnosed Diabetes Mellitus (n = 150)

Diabetes Status	Frequency (n)	Percentage (%)
Newly Diagnosed Diabetes	46	30.7%
Non-Diabetic	104	69.3%

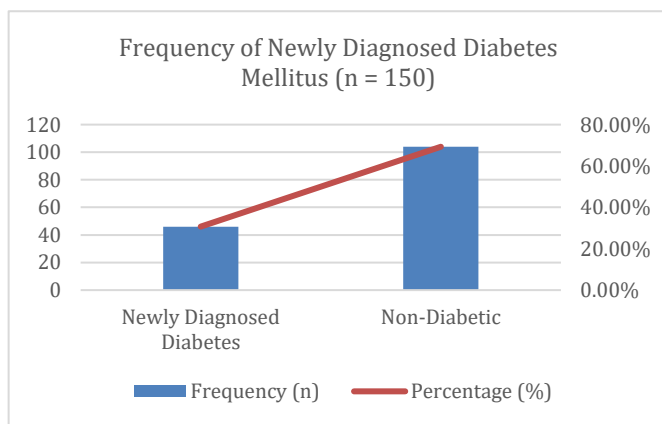


Table 3
Stratification of Newly Diagnosed Diabetes with Respect to Gender

Gender	Newly Diagnosed DM (n)	Non-Diabetic (n)	Total	p-value
Male	30	62	92	0.48
Female	16	42	58	

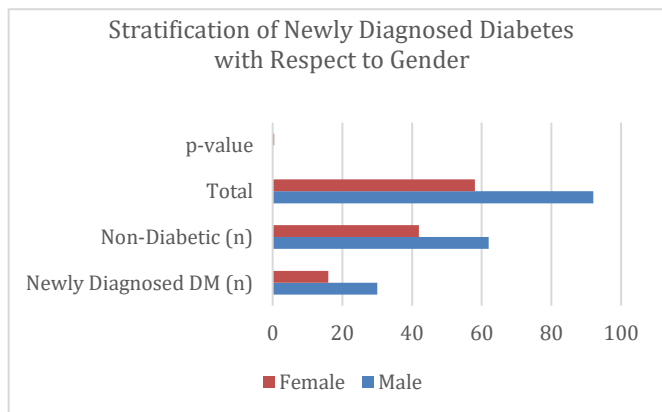
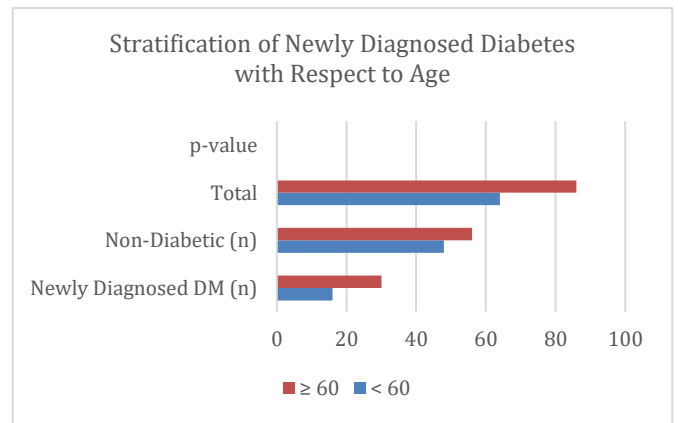


Table 4
Stratification of Newly Diagnosed Diabetes with Respect to Age

Age Group	Newly Diagnosed DM (n)	Non-Diabetic (n)	Total	p-value
< 60	16	48	64	0.09
≥ 60	30	56	86	



Generally, the results suggest that almost 1/3 of patients affected by acute ischemic stroke had a pre-diagnosis of diabetes mellitus, and thus regular screening is critical among patients.

DISCUSSION

The current research was a cross-sectional investigation describing how common the newly diagnosed diabetes mellitus is among the patients that report acute ischemic stroke at a tertiary care hospital in Peshawar. The results showed that 30.7% of patients have never received a diagnosis of diabetes mellitus and highlighted the high cost of occult hyperglycemia in stroke patients (Ogurtsova et al., 2022; Mekala & Bertani, 2020). This leads to the urgent necessity of regular glycemic screening of every patient who present with acute ischemic stroke (Sacco et al., 2024; Dhatariya and Umpierrez, 2024).

The frequency observed in this study is in line with the previous findings of international and regional studies. Indicatively, a study conducted by Zhang et al. (2023) showed that about 2535 per cent of patients experiencing acute stroke had undiagnosed diabetes or unknown hyperglycemia during hospitalization. On the same note, acute ischemic stroke is linked to stress hyperglycemia and undiagnosed diabetes, which is related to poor clinical outcomes, such as high mortality and poor functional outcome (Ferrari et al., 2022; Yao et al., 2023; Yoon et al., 2021).

A potential driving force behind the high incidence of newly diagnosed diabetes in stroke patients is the strong pathophysiological relationship between chronic hyperglycemia and damage to the vascular. These sustained high glucose levels are associated with the dysfunction of endothelial layers, rapid atherosclerosis, and elevated inflammatory reactions, which predisposes people to the occurrence of cerebrovascular injuries (An et al., 2023; González et al., 2023; Maida et al., 2022). Additionally, insulin resistance and impaired glucose metabolism could be masked and need years to be diagnosed and then be complicated by developing stroke (Mosenzon et al., 2023).

In the present study, the percentage of newly diagnosed diabetes was higher in male patients (32.6%) than in females (27.6) although no significant difference was found (p = 0.48). This observation is in line with the literature indicating sex-based variations in metabolic risks profiles and cerebrovascular susceptibility (Wolf et al., 2022; Zhao et al., 2024).

The stratification in terms of age showed that patients aged 60 years and above had more often a freshly diagnosed diabetes than younger patients aged under 60 years but this was also not significantly different ($p = 0.09$). This tendency is backed by the international data of the growing prevalence of diabetes by advanced age as a result of gradual 2D-cell dysfunction of the pancreas and the growth of insulin resistance (Mekala & Bertoni, 2020; Ogurtsova et al., 2022).

The findings of this study have important clinical implications. The diagnosis of hitherto unacknowledged diabetes in stroke patients enables an early glycemic control situation, which can contribute to better neurological outcomes and lessen the chances of experiencing another stroke (Sacco et al., 2024; Janjusevic et al., 2022). Glycemic monitoring and control is a critical aspect of acute stroke (Dhatariya and Umpierrez, 2024; Ferrari et al., 2022).

However, this study has certain limitations. The research is a single center study with a very small sample size, so the conclusions might not be applicable to the general population. Besides, hyperglycemia when stressed by acute illness might also have resulted in an overdiagnosis of newly diagnosed diabetes among some patients (Yao et al., 2023; Ferrari et al., 2022). These results need to be confirmed by future multicenter studies with large samples and extended follow-ups to further

conjecture on the correlation between undiagnosed diabetes and stroke outcomes.

Finally, it is concluded that a large share of the patients of acute ischemic stroke miss the presence of diabetes mellitus previously. To guarantee an early diagnosis and a better patient outcome, regular screening with fasting blood glucose and HbA1c ought to be a part of a stroke management protocol as they help in timely managing the condition.

CONCLUSION

To sum up, the given study proves that a significant percentage of patients with the diagnosis of acute ischemic stroke had undiagnosed diabetes mellitus. The frequent occurrence indicates the quietness of diabetes and its enormous impact on the cerebrovascular disease. Fasting blood glucose and HbA1c levels screening of all stroke patients should be on a routine agenda to detect early and manage them. It is important not only to identify undiagnosed diabetes at the time of stroke and optimize acute care but is also significant to prevent recurrence of vascular events and to improve long-term outcomes. The results of the research highlights the necessity of diabetes screening programs being incorporated into regular stroke management routine, especially in those areas of the world with limited resources such as Pakistan where the prevalence of both diseases is growing at a high rate.

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