FREQUENCY OF UNDIAGNOSED HYPERTENSION AND DIABETES MELLITUS IN PATIENTS WITH STROKE

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Abstract

Background: Each year, approximately 795,000 people in developed nations suffer from a stroke. A significant number of these cases could be avoided through measures like managing blood pressure, adopting a nutritious diet, engaging in regular exercise, and quitting smoking. Our study reveals the prevalence of hypertension and diabetes in the population we examined, suggesting the need for a national-level screening program targeting individuals at high risk of stroke, with potential policy recommendations based on our findings.

Objective: To determine the frequency of undiagnosed diabetes mellitus and hypertension among stroke patients at Hayatabad Medical Complex Peshawar.

Material and Methods: The cross-sectional study was conducted at Hayatabad Medical Complex Peshawar, from May 2022 to November 2022. Each patient underwent a thorough physical examination, including two separate blood pressure readings taken 30 minutes apart using a standard mercury sphygmomanometer. Additionally, blood sugar levels were checked upon admission and subsequently measured for fasting blood sugar on consecutive days until discharge. Additionally, a detailed physical examination was conducted for all patients, and blood pressure was measured using a standard mercury sphygmomanometer on two separate occasions with a 30-minute interval. Information on undiagnosed diabetes mellitus and hypertension was recorded based on the operational definition and documented on a specially designed form.

The entry and analysis of data were carried out using SPSS 25. Percentages and frequencies were employed for categorical variables such as gender, type of stroke, undiagnosed hypertension, and undiagnosed diabetes. The mean and standard deviation were employed to analyze quantitative variables such as age. Undiagnosed diabetes mellitus and hypertension were stratified by age, gender, and type of stroke. Post-stratification chi-square tests were used, with statistical significance set at $p \leq 0.05$ to indicate meaningful results.

Results: In this study a total of 126 patients were included or enrolled. Mean age of patients was 58.04+/-6.15 years. Most patients (77.8%) had an ischemic stroke, while 28.6% had hemorrhagic stroke. Mean blood pressure of patients was 180/90+/-15 mmHg and mean blood sugar was 210+/-12 mg/dl. The prevalence of undiagnosed diabetes was found to be 28.6%, and undiagnosed hypertension was 19% among the stroke patients.

Conclusion: Stroke patients exhibited a notable prevalence of undiagnosed hypertension and diabetes Hence stroke patients should be screened for hypertension, a family history of diabetes mellitus, and for obesity.

Keywords: Stroke, Undiagnosed hypertension, Undiagnosed diabetes

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Introduction

Every year, approximately 795,000 individuals in developed nations suffer stroke, with 87% being ischemic strokes and 185,000 classified as recurrent cases (1). In present times, the incidence of recurrent strokes and transient ischemic attacks, which are linked to high-risk factors, has shown a decline owing to the adoption of multiple strategies for secondary stroke prevention (2). There was a meta-analysis on randomized controlled trials, which included therapies for preventing secondary strokes from 1960 to 2009, found a notable drop in annual recurrence rates of stroke. It was noted that rates decreased from 8.7% in the 1960s to

5.0% in the 2000s. This decline was primarily linked to increased measures in managing blood pressure and using antiplatelet therapy. Effective stroke prevention strategies include maintaining healthy blood pressure levels, following a nutritious diet, quitting smoking, and engaging in regular physical activity (3). The INTERSTROKE study identified key risk factors that account for 82% to 90% of the population's risk for ischemic and hemorrhagic strokes. These risk factors encompass dietary patterns, lack of physical activity, hypertension, habit of smoking, and abdominal obesity (3).

According to the Global Burden of Disease Study, 90.5% of the global stroke burden can be attributed to factors that can be modified (4). Based on research, using a combination of aspirin, statin, and antihypertensive medications alongside dietary changes and consistent exercise can result in an 80% overall decrease in the risk of recurring vascular incidents (5). Research by Zehra F et al. revealed that 20% of stroke patients had diabetes mellitus that had not been diagnosed (6). Khan Li et al. reported that 33.7% of stroke patients had undiagnosed hypertension (7).

Our current study aims to determine the prevalence of undiagnosed diabetes mellitus and hypertension among stroke patients. No such study was one before in KPK identifying these conditions in our study population will help understand the burden they impose. This understanding can lead to policy recommendations at the national level, advocating for an effective screening program targeting individuals at a high risk of stroke_

Methodology

The cross-sectional study was conducted at Hayatabad Medical Complex Peshawar, from May 2022 to November 2022. A cross-sectional study design was employed for this research. The sample size of 126 participants was calculated using the WHO sample size software, taking into account a 95% confidence level, a 7% margin of error, and an expected prevalence of undiagnosed diabetes among stroke patients at 20%. The sampling method employed was non-probability consecutive sampling. The study enrolled both men and women aged 20 to 70 years with established stroke having CT findings. Excluded from participation were individuals with previously diagnosed diabetes or hypertension, a history of recurrent strokes, chronic liver disease, valvular heart disease, those taking anti-coagulant medications, or with a history of bleeding. Data were gathered from patients meeting our inclusion criteria in the Department of Medicine, following approval from the ethics committee. We noted basic demographic details such as age, gender, and type of stroke. Patients were given informed consent, which assured confidentiality and clarified that there were no risks involved for them. All subjects underwent a thorough physical examination, including blood sugar measurement upon admission and consecutive daily fasting blood sugar level monitoring until discharge. Additionally, a blood pressure was measured using a standard mercury sphygmomanometer on two separate occasions with a 30-minute interval. Information on undiagnosed diabetes mellitus and hypertension was recorded based on the operational definition and documented on a specially designed form.

The Data was entered on a preformed Performa and was analyzed by using SPSS 25. Percentages and frequencies were employed for categorical variables such as gender, type of stroke, undiagnosed hypertension, and undiagnosed diabetes. The mean and standard deviation were employed to analyze quantitative variables such as age. Undiagnosed diabetes mellitus and hypertension were stratified by age, gender, and type of stroke. Post-stratification chi-square tests were used, with statistical significance set at $p < 0.05$ to indicate meaningful results.

Results

In this study a total of 126 patients were included or enrolled. Mean age of patients was 58.04+/-6.15 years. Male patients constituted 81% of the sample, while females comprised 19%. Ischemic stroke was diagnosed in 77.8% of the patients, while 22.2% had hemorrhagic stroke. The prevalence of undiagnosed diabetes mellitus among stroke patients was 28.6%, and undiagnosed hypertension was found in 19% of the cases.

Stratification of undiagnosed diabetes mellitus and hypertension with respect to age, gender and type of stroke are shown in Tables-I, II, III, IV, V and V I respectively. Patients with hemorrhagic stroke exhibited a notably higher prevalence of undiagnosed hypertension and undiagnosed diabetes

compared to those with ischemic stroke. This difference demonstrated a significant association, as indicated

Table-I: Stratification of undiagnosed diabetes mellitus with respect to age

Age (years)		Undiagnosed diabetes mellitus		p-value
		Yes	No	
	30-50	9(52.9%)	8(47.1%)	
	51-70	27(24.8%)	82(75.2%)	0.017
Total		36(28.6%)	90(71.4%)	

Table-II: Stratification of undiagnosed diabetes mellitus with respect to gender.

Gender		Undiagnosed diabetes mellitus		p-value
		Yes	No	
	Male	30(29.4%)	72(70.6%)	
	Female	6(25%)	18(75%)	0.667
Total		36(28.6%)	90(71.4%)	

Table-III: Stratification of undiagnosed diabetes mellitus with respect to type of stroke.

Type of Stroke		Undiagnosed diabetes mellitus		p-value
		Yes	No	
	Ischemic	18(18.4%)	80(81.6%)	
	Hemorrhagic	18(64.3%)	10(35.7%)	0.000
Total		36(28.6%)	90(71.4%)	

Table-IV: Stratification of undiagnosed hypertension with respect to age

Age (years)		Undiagnosed hypertension		p-value
		Yes	No	
	30-50	4(23.5%)	13(76.5%)	
	51-70	20(18.3%)	89(81.7%)	0.613
Total		24(19%)	102(81%)	

Table-V: Stratification of undiagnosed hypertension with respect to gender

Gender		Undiagnosed hypertension		p-value
		Yes	No	
	Male	20(19.6%)	82(80.4%)	
	Female	4(16.7%)	20(83.3%)	0.741
Total		24(19%)	102(81%)	

Table-VI: Stratification of undiagnosed hypertension with respect to type of stroke

Type of stroke		Undiagnosed hypertension		p-value
		Yes	No	
	Ischemic	10(10.2%)	88(89.8%)	
	Hemorrhagic	14(50%)	14(50%)	0.000
Total		24(19%)	102(81%)	

Discussion

Our findings revealed that the prevalence of undiagnosed diabetes was 28.6%, notably higher among patients with hemorrhagic stroke. This aligns with data from five separate studies, which reported diabetes frequencies ranging from 8.2% to 50.2%(8),(9),(10),(11),(12). A meta-analysis revealed that stroke patients have a 20 to 33% higher occurrence of diabetes compared to the general population, particularly prevalent among those with ischemic stroke rather than hemorrhagic stroke (13). While local data concerning diabetes prevalence among hemorrhagic stroke patients is scarce, a study in Karachi by Zebra et al. found an undiagnosed diabetes rate of 20% in individuals with ischemic stroke (6).

Stress-induced hyperglycemia has been linked to poorer functional outcomes and increased early mortality rates in individuals with acute hemorrhagic stroke, irrespective of their diabetic status. This association remains significant even after considering stroke severity and subtypes(14),(15). In their study with stroke patients, Snarska et al. discovered a consistent connection between high blood sugar levels at admission and an increase in mortality rates during hospitalization (14).

Newly diagnosed diabetes mellitus patients showed a significantly higher prevalence of hypertension, obesity and family history of diabetes mellitus compared to non-diabetic patients (pc0.05). Hence, these factors were identified as typical risk elements intertwined with the development of newly diagnosed DM among individuals experiencing hemorrhagic stroke. Although family history cannot be changed, it emphasizes the importance of early diabetes screening for stroke patients with a family history of diabetes. Conversely, hypertension and obesity, being modifiable risk factors, can be managed through lifestyle adjustments and dietary changes. An in-depth review incorporating studies on the interplay between diabetes and stroke

outcomes suggest that gender, BMI, age, anti-hyperglycemic medication use and complications related to diabetes are confounding variables influencing the frequency of diabetes among stroke patients and its outcomes (16).

It is vital to manage diabetes and hyperglycemia in patients with stroke. Timely and accurate screening for diabetes is essential to alleviate the increasing burden that these dual conditions place on the global healthcare system. Taking into account the constrained healthcare infrastructure in Pakistan, as well as the disease burden and suboptimal management, the substantial rate of newly diagnosed diabetes among individuals with hemorrhagic stroke identified at the specific study center is alarming. It indicates a lack of awareness about the disease and its intricacies, emphasizing the substantial underdiagnosis prevalent in the area.

Several limitations should be recognized within this study. Primarily, the sample size was constrained. Additionally, the data was confined to a solitary center in Peshawar, which constrains the applicability of the results to the larger local population. Furthermore, our research did not explore stroke outcomes, such as how the prevalence of newly diagnosed diabetes mellitus among these individuals with stroke could affect their recovery and prognosis following a stroke. More comprehensive prospective investigations are warranted to explore the link between diabetes and various stroke consequence parameters.

Conclusion

The study findings highlight the high occurrence of newly diagnosed hypertension

and diabetes among individuals with stroke. Our recommendation is to screen these stroke patients for hypertension, a family history of diabetes mellitus, and for obesity. This proactive approach can help reduce associated morbidity and mortality.

Conflict of Interest

No conflict of interest declared by the author.

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