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KNOWLEDGE ABOUT STROKE OF PATIENTS WITH TYPE 2 DIABETES AT TRA VINH GENERAL HOSPITAL, VIETNAM

Huynh To Nhu[1*], Nguyen Thi Ngoan[2], Huynh Hoai Phuong[3]

Abstract – *The objective of the study is to survey knowledge about stroke in patients with type 2 diabetes. A descriptive cross-sectional research design was employed, involving 311 patients with type 2 diabetes who received outpatient care at Tra Vinh General Hospital between May and July 2024. The results showed that 25.1% of patients with type 2 diabetes had satisfactory knowledge, and 74.9% had inadequate knowledge about stroke prevention. Age was found to be significantly associated with stroke prevention knowledge among patients with type 2 diabetes ($p < 0.05$). These findings indicated that the knowledge about stroke in diabetic patients is limited, highlighting the need for timely interventions to improve understanding of stroke in patients with type 2 diabetes.*

Keywords: diabetes, prevention, stroke, Tra Vinh General Hospital.

I. INTRODUCTION

Experiencing a stroke leaves the patient with severe consequences and significantly reduces their quality of life. The mortality rate of stroke ranks second behind cancer and is higher than that of myocardial infarction. Stroke is the leading cause of disability, and despite treatment, it often results in severe sequelae, creating a considerable burden for both families and society [1, 2]. In Vietnam, it is estimated that approximately 200,000 new stroke cases occur each year [1]. Among survivors, the likelihood of disability and dependence is high. Statistics show that about 10–13% of stroke survivors remain disabled and bedridden, 12% achieve partial recovery, and only 25% can regain independent ambulation after stroke [1]. Among the risk factors for stroke, diabetes mellitus is a particularly important determinant. Patients with diabetes have a 1.5- to 3-fold higher risk of stroke than non-diabetic individuals [4]. Several pathophysiological mechanisms contribute to this increased risk, including chronic hyperglycemia, insulin resistance, dyslipidemia, endothelial dysfunction, oxidative stress, and accelerated atherosclerosis. These changes damage blood vessels and impair cerebral circulation, increasing susceptibility to both ischemic and hemorrhagic stroke. Diabetic patients are also more likely to have multiple comorbidities such as hypertension, obesity, and dyslipidemia, which further elevate their risk of stroke [5]. Given their heightened biological vulnerability, patients with type 2 diabetes must possess adequate knowledge about stroke prevention. This includes awareness of modifiable risk factors, recognition of early warning signs, and appropriate emergency responses. Early recognition and prompt response, especially calling emergency services immediately, play a critical role in improving clinical outcomes, reducing complications, and enhancing survival and recovery rates. However, research has shown that diabetic patients often have limited knowledge of stroke, particularly in identifying warning signs and knowing when to seek urgent medical care [6]. Therefore, to preliminarily assess the knowledge of diabetic patients regarding stroke prevention, a descriptive cross-sectional study was conducted at Tra Vinh General Hospital.

II. LITERATURE REVIEW

Stroke occurs when there is a sudden loss of blood flow to the brain (ischemia) or rupture of a blood vessel (cerebral hemorrhage), leading to

[1,2,3]Tra Vinh University, Vietnam
*Corresponding author: htnhu@tvu.edu.vn
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impaired function or death of brain cells. Stroke is one of the causes of paralysis, typespeech disorders, sensory disorders, memory impairment, coma, and a high mortality rate [7, 8]. According to findings reported by Nguyen Van Trieu [9], there are some important and common stroke risk factors that the study subjects only recognized at a low level, such as diabetes (53%), transient ischemic attack (49%), and dyslipidemia (9%). Xaysanith et al. [10] reported that 59.0% of type 2 diabetic outpatients at Nam Dinh City Medical Center had an overall level of stroke-prevention knowledge categorized as adequate. The study by Xuan Thi Thu Huong et al. [11], conducted on 162 caregivers of stroke patients at the Stroke Department, Institute of Neurology, 108 Military Central Hospital, showed that community awareness of stroke remained low, with only 4.8% knowing the rapid recognition symptoms of stroke. Regarding awareness of stroke risk factors, most participants considered previous stroke (85.7%), dyslipidemia (88.1%), and hypertension (96.42%) as risk factors [11]. Meanwhile, chronic diseases and lifestyle-related risk factors were less recognized, such as alcohol consumption (38.1%), smoking (27%), and physical inactivity (26.2%). The study also revealed that, upon detecting a stroke patient, only 7.1% of participants chose to call emergency services. In comparison, 47,6% opted to wait until the patient's condition stabilized before taking them to the hospital [11]. The study conducted by Do Thi Thu Hien [12] indicated that, although a high level of awareness was observed for typical stroke symptoms such as unilateral weakness and speech disturbances, recognition of less obvious signs, including sudden memory loss, remained limited. An interventional study by Dinh Thi Yen [13] demonstrated that health education significantly improved participants' knowledge of stroke warning signs and risk factors, as well as their ability to respond appropriately in emergencies. In addition, Nguyen Phuong Thuy [14] emphasized the importance of enhancing awareness, attitudes, and practices among stroke patients and their caregivers to facilitate early recognition of stroke symptoms and timely hospital admission, thereby reducing long-term sequelae and the overall burden on families and society. Although these studies have provided valuable insights into stroke-related risk factors and general awareness among various groups [9–14], several limitations persist. Most research has focused either on caregivers, elderly populations, or the general community, rather than specifically targeting patients with type 2 diabetes, who are at significantly higher risk of stroke due to metabolic and vascular complications. Therefore, there remains a notable research gap regarding stroke prevention knowledge, specifically among patients with type 2 diabetes in Vietnam. The present study aims to address this gap by assessing stroke prevention knowledge in this high-risk group and identifying related factors, thereby providing evidence for targeted educational interventions and contributing to the development of improved stroke prevention strategies in clinical practice.

III. METHODOLOGY

A. Location, participants, and time of research

Patients diagnosed with type 2 diabetes who attended the Outpatient Examination Department of Tra Vinh General Hospital from May 6 to July 12, 2024, were recruited for the study. Eligibility criteria included patients aged 18 years and above, diagnosed with type 2 diabetes, and able to read, write, and communicate in Vietnamese. Patients with cognitive impairment or severe complications that affected their ability to participate were excluded.

B. Methods

The study employed a descriptive cross-sectional design, and data were collected through direct patient interviews using a structured and previously validated questionnaire. The sample size was determined based on Formula (1).

$$n = Z^2_{1-\frac{\alpha}{2}} \frac{p(1-p)}{d^2}$$

In which:

n is the sample size.

$Z^2_{1-\frac{\alpha}{2}} = (1,96)^2$, the confidence coefficient at 95%, $\alpha = 0.05$.

d is the margin of error, set at d = 0.05.

p is the estimated proportion.

The value of p was based on results reported by Do Thi Thu Hien et al. [12], indicating that 71.8% of elderly patients with type 2 diabetes mellitus demonstrated adequate stroke-prevention knowledge. By substituting p = 0.718 into Formula (1), the sample size was calculated as n = 311. A total of 311 diabetic patients who met the eligibility criteria were selected for the study.

Data collection tools

The questionnaire on stroke-related knowledge among patients with type 2 diabetes mellitus at Tra Vinh General Hospital consisted of 23 items adapted from a scientific research project conducted by Xuan Thi Thu Huong et al. [11]. Each correct answer was scored as 1 point, and each incorrect answer as 0 points. Patients were considered to have adequate knowledge if they answered correctly $\geq$ 50% ($\geq$ 12/23 questions), and inadequate knowledge if they answered correctly < 50% (< 12/23 questions).

Data collection techniques

Data were collected using a convenience sampling method. Patients with type 2 diabetes who visited the outpatient department for examination and treatment from May 2024 were consecutively recruited until the required sample size was achieved. Data collection was conducted through structured interviews using a pre-designed questionnaire, ensuring that information on patients' knowledge, attitudes, and practices regarding diabetes management was systematically obtained.

Data analysis methods

Collected data were entered and analyzed using statistical software. Descriptive statistics were applied to summarize demographic characteristics and knowledge levels. The Chi-square test and odds ratio (OR) with a 95% confidence interval (CI) were employed to examine the associations between knowledge level and demographic or clinical variables. A p-value of <0.05 was considered statistically significant.

C. Ethics in research

Participation in this study is entirely voluntary, and research subjects have the right to decline involvement at any time without any consequences. Prior to participation, the objectives and procedures of the study will be clearly explained to all subjects. All information collected will be kept strictly confidential and used solely for research purposes.

IV. RESULTS AND DISCUSSION

A. General characteristics of the research subjects

Table 1: Duration of diabetes (n = 311)

Characteristics	Frequency	Proportion (%)
Age of the research subjects		
18–36	6	1.9
37–55	66	21.2
56–70	193	62.1
Over 70	46	14.8
Gender		
Male	98	31.5
Female	213	68.5
Duration of diabetes		
Less than 1 year	26	8.4
2–3 years	34	10.9
3–4 years	43	13.8
More than 4 years	208	66.9
Knowledge of stroke		
Adequate	78	25.1
Inadequate	233	74.9

Table 1 shows that the highest proportion of patients fell within the age group of 56 to 70 (62.1%). This finding is consistent with the study by Do Thi Thu Hien et al. [12], which reported that 64.5% of patients were between 60 and 69 years of age, representing the largest proportion. This similarity suggests that the incidence of diabetes is relatively high in older adults, which is itself a risk factor for the disease. Therefore, routine health check-ups are essential in this population to ensure early detection and treatment.

Regarding gender distribution, females accounted for the majority, representing 68.5% of the participants. This finding is consistent with

the results of Do Thi Thu Hien et al. [12], where females constituted 58.1% of the 248 patients surveyed. Similarly, the study by Dinh Thi Yen [13] reported a higher proportion of female patients (64.4%) than male patients (35.6%). In line with these findings, Xaysanith et al. [10] also documented that females predominated among study participants, with a proportion of 65.4%. However, large epidemiological studies have not demonstrated a clear predominance of either gender in susceptibility to type 2 diabetes. The higher proportion of female participants in this study may be attributed to sampling characteristics, health-seeking behaviors, or the fact that women are generally more likely to attend outpatient clinics and participate in health-related surveys. Therefore, this finding should not be interpreted as evidence of a higher prevalence of diabetes among women or greater awareness in this group. Instead, it indicates the need for future studies with more representative sampling methods to assess gender-related differences in diabetes and stroke awareness accurately.

Furthermore, 67.8% of patients in this study had been living with diabetes for more than four years. This indicates that a substantial proportion of patients had long-standing diseases, likely experiencing multiple phases of treatment and disease management. This finding aligns with the study by Xaysanith et al. [10], which reported that 52.0% of patients had diabetes for 5 to 10 years. These results emphasize the importance of establishing chronic disease management programs and providing continuous support to patients throughout their treatment to improve disease control and quality of life.

B. Knowledge of stroke among the research subjects

Figure 1 shows that 25.1% of type 2 diabetes patients demonstrated adequate overall knowledge of stroke. This proportion is lower compared to the study by Xaysanith et al. [10] (59.0%) and the findings of Do Thi Thu Hien [12] (71.8%).

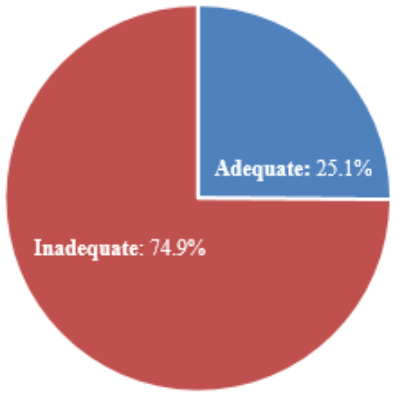

Fig. 1: Knowledge about stroke prevention

Table 2: Knowledge of stroke risk factors

Stroke risk factors	Frequency		Proportion (%)	
	Present	Absent	Present	Absent
Hypertension	268	43	86.2	13.8
Dyslipidemia	103	208	33.1	66.9
Diabetes	212	99	68.2	31.8
Elderly	205	106	65.9	34.1
Atherosclerosis	85	226	27.3	72.7
Smoking	126	185	40.5	59.5
Previous stroke	259	52	83.3	16.7
Obesity	97	213	31.2	68.5
Embolism	166	145	53.4	46.6

Table 3: Stroke warning signs

Stroke warning signs	Frequency		Proportion (%)	
	Present	Absent	Present	Absent
Speech difficulty, incomprehensible speech	136	175	43.7	56.3
Dyspnea	164	147	52.7	47.3
Headache	191	120	61.4	38.6
Blurred vision	122	189	39.2	60.8
Chest pain	154	157	49.5	50.5
Dizziness, loss of balance	199	112	64.0	36.0
Numbness or weakness of one side of the body	271	38	87.1	12.2

Table 4: Management of stroke warning signs

Management of stroke warning signs	Frequency (Proportion %)				
	Hospital visit	Calling a consult	Calling 115	Calling family	Others
Speech difficulty, incomprehensible speech	157 (50.5)	0 (0)	38 (12.2)	116 (37.3)	0 (0)
Dyspnea	168 (54.0)	2 (0.6)	97 (31.2)	44 (14.2)	0 (0)
Headache	142 (45.7)	2 (0.6)	23 (7.4)	144 (46.3)	0 (0)
Blurred vision	247 (79.4)	2 (0.6)	4 (1.3)	29 (9.3)	29 (9.3)
Chest pain	198 (63.7)	1 (0.3)	88 (28.3)	24 (7.7)	0 (0)
Dizziness, loss of balance	232 (74.6)	1 (0.3)	43 (13.8)	35 (11.3)	0 (0)
Numbness or weakness of one side of the body	203 (65.3)	2 (0.6)	86 (27.7)	19 (6.1)	1 (0.3)

The study assessed patients' knowledge of stroke across three domains: understanding risk factors, recognizing warning signs, and knowing appropriate responses to minimize and prevent a stroke. Table 2 shows that most participants identified hypertension as a risk factor, with 82.6% acknowledging it. However, the proportion in this study was considerably lower than that reported by Do Thi Thu Hien [12], in which 99.2% of participants identified hypertension as a primary risk factor for stroke. In the study, 68.2% of participants identified diabetes itself as a risk factor for stroke – a relatively high proportion, reflecting awareness of the link between diabetes and experiencing a stroke. This finding is consistent with the results of Xuan Thi Thu Huong et al. [11], in which 69.8% of participants also recognized diabetes as a risk factor. Such awareness is crucial in improving preventive behaviors and disease management among diabetic patients, encouraging lifestyle modifications, routine health monitoring, and effective disease control, thereby reducing stroke risk. In Table 3, regarding the recognition of stroke warning signs, 87.1% of participants identified numbness and weakness of one side of the body, making it the most frequently recognized symptom. Other warning signs were less commonly identified: dizziness and imbalance (64.0%), headache (49.5%), speech difficulty (43.7%), and blurred vision (39.2%). When compared with findings from a study conducted at Phu Tho General Hospital, where 94.9% of respondents recognized unilateral weakness and 91.3% identified speech disturbances as stroke warning signs, the level of awareness observed in the present study remains relatively high. This suggests that diabetic patients in this setting demonstrate a considerable understanding of early stroke symptoms, although certain warning signs – such as blurred vision and headache – were less consistently identified [3].

When asked about appropriate responses to stroke warning signs, Table 4 showed that only 12.2% of participants reported that they would call emergency services and take the suspected stroke patient to a hospital. This reflects a rather low level of awareness regarding appropriate emergency response to stroke. In comparison, Do Thi Thu Hien [12] reported a much higher proportion (96.4%) of participants who would call for emergency assistance when stroke symptoms appeared. Similarly, Xuan Thi Thu Huong [11] indicated that 25% of participants were prepared to take immediate emergency action in such situations. This large discrepancy may reflect differences in community awareness and readiness to respond to emergencies.

These findings emphasize the need for emergency stroke management education and communication in order to reduce mortality rates and improve proper recovery. Furthermore, the results provide an important basis for developing effective public health education strategies and programs that raise community awareness and promote appropriate behaviors in stroke prevention and management.

Table 5: Association between general sample characteristics and knowledge of type 2 diabetes patients about stroke prevention

Characteristics	Knowledge (n = 311)		p-value	OR (95% CI)
	Adequate n (%)	Inadequate n (%)		
Age				
18–36	3 (50)	3 (50)		1
37–55	20 (30.3)	46 (69.7)	0.005	0.44 (0.21–0.91)
55–70	53 (27.46)	140 (72.54)	0.003	0.38 (0.19–0.76)
Over 70	2 (4.35)	44 (95.65)	0.004	0.045 (0.009–0.22)
Gender				
Male	29 (29.6)	69 (70.4)	0.214	1
Female	49 (23)	164 (77)		0.711 (0.415–1.218)
Duration of diabetes				
< 1 year	6 (23.08)	20 (76.92)		1
2–3 years	9 (26.47)	25 (73.53)	0.743	1.2 (0.37–3.94)
3–4 years	8 (18.6)	35 (81.4)	0.713	0.76 (0.23–2.51)
More than 4 years	55 (26.44)	153 (73.56)	0.282	1.2 (0.46–3.14)

In Table 5, differences in the level of knowledge about diabetes among different age groups were observed. In particular, the age group 55–70 had a higher knowledge rate than the age group 37–55. This difference was statistically significant with a p-value < 0.05, indicating that older age groups tended to have better knowledge about diabetes. This result is different from the study by Nguyen Phuong Thuy et al. [14], in which the age group under 60 had a higher rate of correct awareness about stroke than the age group over 60. This difference was also statistically significant with a p-value < 0.05, indicating that

in their study, the difference in the level of awareness between the two age groups was clear and significant. These findings emphasize the importance of assessing and improving knowledge about diseases such as diabetes in different age groups. Besides, public health education and care strategies should be tailored to the characteristics and needs of each target group, thereby helping to improve the effectiveness of disease prevention and management in the community.

V. CONCLUSION AND RECOMMENDATIONS

A total of 25.1% of patients with type 2 diabetes mellitus demonstrated adequate knowledge of stroke prevention. Among the study participants, 68.2% recognized diabetes as a risk factor for stroke. The majority (87.1%) identified numbness and weakness as warning symptoms of stroke. However, only 12.2% reported that they would call emergency services and take a suspected stroke patient to the hospital. It is necessary to implement regular health education programs both in hospitals and within the community, focusing on risk factors, recognition of warning signs, and appropriate management of stroke. Educational materials (leaflets, posters, videos) should be developed in a clear and accessible manner, tailored to different target groups, to enhance knowledge and awareness of stroke symptoms and prevention. Collaboration with social organizations and community groups is recommended to organize health education activities and promote stroke awareness at the community level.

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