

Self-Care Behaviors and Treatment Adherence Among Patients With Type 2 Diabetes Mellitus and Stroke

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SUMMARY

Background: Self-care and treatment adherence are key factors in the management of type 2 diabetes mellitus and the prevention of complications; therefore, assessing this status in patients with stroke is essential to optimize clinical management.

Objectives: To describe the status of self-care behaviors and treatment adherence among patients with type 2 diabetes mellitus and stroke at the Department of Neurology, Thai Nguyen National Hospital in 2026.

Methods: A cross-sectional descriptive study was conducted on 70 inpatients with type 2 diabetes mellitus and stroke treated at the Department of Neurology, Thai Nguyen National Hospital from February 2026 to June 2026. Self-care behaviors were assessed using the Summary of Diabetes Self-Care Activities (SDSCA) scale, and medication adherence was evaluated using the 8-item Morisky Medication Adherence Scale (MMAS-8).

Results: The majority of patients achieved a good level of overall self-care behaviors according to the SDSCA (85.7%). The dietary regimen had the highest rate of good adherence (85.7%), whereas self-monitoring of blood glucose had the lowest rate of good adherence (17.1%). The rate of high and medium medication adherence evaluated by the MMAS-8 was 94.3%. No statistically significant correlations were observed between demographic characteristics, lifestyle habits, or clinical features and the levels of self-care and medication adherence ($p > 0.05$).

Conclusion: Patients with type 2 diabetes mellitus and stroke generally demonstrated good self-care behaviors and medication adherence. No statistically significant correlations were found between demographic characteristics, lifestyle habits, or clinical features and the levels of self-care and medication adherence.

Keywords: Type 2 diabetes mellitus, stroke, self-care behaviors, SDSCA, MMAS-8.

I. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a non-communicable chronic disease with a rapidly increasing prevalence and burden of complications worldwide and in Vietnam. According to the International Diabetes Federation (IDF), approximately 463 million people worldwide were affected by the disease in 2019¹. Stroke is one of the most severe complications, contributing to increased mortality and disability rates, as well as impaired functional and cognitive status in patients with T2DM. In the management of T2DM, self-care behaviors (including nutrition, physical activity, blood glucose monitoring, medication adherence, and foot care) play a central role in glycemic control and complication prevention. Nevertheless, self-care capacities are frequently compromised in T2DM patients with a history of stroke due to physical and psychological limitations. Numerous domestic and international studies indicate a substantial gap between self-care knowledge and practice. In Vietnam, research focusing specifically on T2DM patients with concurrent stroke remains very limited. To provide scientific evidence for clinical care and health education, this study was conducted with the objective: *To describe the current status of self-care behaviors and treatment adherence among patients with type 2 diabetes mellitus and stroke at the Department of Neurology, Thai Nguyen National Hospital in 2026.*

II. RESEARCH SUBJECTS AND METHODS

2.1. Research subjects

It included 70 inpatients with T2DM and stroke who were undergoing inpatient treatment at the Department of Neurology, Thai Nguyen National Hospital.

* **Inclusion criteria:** Patients diagnosed

with stroke based on clinical manifestations and compatible imaging evidence on cranial computed tomography (CT) or magnetic resonance imaging (MRI), according to the definition of the American Heart Association/American Stroke Association (AHA/ASA); diagnosed with T2DM prior to the onset of stroke and currently taking anti-diabetic medications according to their outpatient prescriptions; capable of communicating, answering interview questions, and providing informed consent to participate in the study.

* **Exclusion criteria:** Patients incapable of communication (dementia, aphasia).

2.2. Study setting and duration

The study was conducted at the Department of Neurology, Thai Nguyen National Hospital, from February 2026 to June 2026.

2.3. Study design and sampling method

* Design: Descriptive study.

* Sampling technique: Non-probability sampling (convenience sampling), including all patients meeting the inclusion criteria during the study period (n = 70).

2.4. Study instruments and variables

General information: Age, gender, educational level, marital status, economic status, clinical history, body mass index (BMI), and stroke type.

SDSCA (Summary of Diabetes Self-Care Activities) scale: Used to assess self-care domains (diet, physical activity, blood glucose monitoring, and foot care). Overall classification: poor (0-21 points), moderate (22-35 points), and good (36-63 points).

MMAS-8 (Morisky Medication Adherence Scale): Used to assess medication adherence levels (8 items). Classification: poor (1-2 points), moderate (3-4 points), good (5-7 points), very good (8 points).

2.5. Data collection

Data were collected through direct interviews using structured questionnaires combined with medical record reviews. Prior to the study, investigators were trained on the study contents, interview skills, and data collection procedures to minimize bias.

2.6. Statistical analysis

Data were analyzed using medical statistical methods with SPSS software (version 27.0): Student’s t-test for comparing two means

and Chi-square test for comparing two proportions.

2.7. Ethical considerations

The study was approved by the Institutional Ethics Committee in Biomedical Research of Thai Nguyen National Hospital under Decision No. 429/QD-BV, dated February 9, 2026.

III. RESULTS

3.1. General characteristics and medical history of the study participants

Table 3.1. Characteristics of the study participants

Age (years)	Mean ± SD	Min	Max
	67.27 ± 10.82	36	91
Characteristics		Number of patients	Percentage (%)
Gender	Male	33	47.1
	Female	37	52.9
Ethnicity	Kinh	51	72.9
	Tay	11	15.7
	Nung	6	8.6
	Other	2	2.9
Residence	Urban	41	58.6
	Rural	29	41.4
Living arrangement	Living with family	66	94.3
	Living alone	4	5.7
Educational level	No schooling, primary, or lower secondary school	13	18.6
	Upper secondary school, college, or university	57	81.4
Medical service payment capability	Easy	57	81.4
	Difficult	13	18.6
BMI (kg/m²)	< 23	35	50.0
	≥ 23	35	50.0
Stroke type	Cerebral hemorrhage	7	10.0
	Cerebral infarction	43	61.4
	Unspecified	20	28.6

According to Table 3.1, the mean age of the patients was 67.27 ± 10.82 years, with females accounting for a higher proportion than males (52.9% versus 47.1%). The majority of patients were of the Kinh ethnic group (72.9%), lived in urban areas (58.6%), and lived with their families (94.3%). Most patients had an

educational level of upper secondary school or higher (81.4%) and reported that paying for medical services was easy (81.4%). The proportions of patients with a BMI $<23 \text{ kg/m}^2$ and $\geq 23 \text{ kg/m}^2$ were equivalent (50.0%). Cerebral infarction was the predominant stroke type (61.4%).

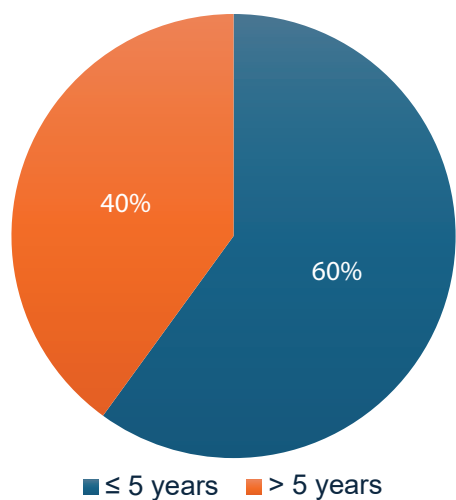


Figure 3.1. Duration of T2DM

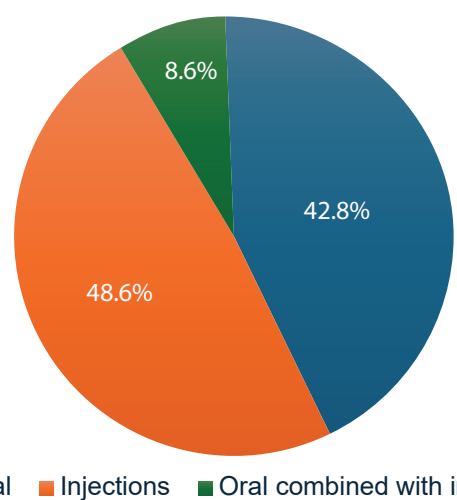


Figure 3.2. Treatment status of T2DM

According to Figures 3.1 and 3.2, patients with a duration of T2DM of ≤ 5 years accounted for 60.0%, those treated solely with insulin injections accounted for 48.6%, and those treated with a combination of insulin injections and oral medications accounted for 8.6%.

Table 3.2. Characteristics and levels of medication adherence according to the MMAS-8 scale

Level of adherence according to the MMAS-8 scale	Number of patients	Percentage (%)
Very good	37	52.9
Good	29	41.4
Moderate, Poor	4	5.7
Total	70	100
Adherence characteristics according to the MMAS-8 scale	Number of patients	Percentage (%)
M1 - Never forget to take medication	52	74.3
M2 - Take medication adequately	63	90.0
M3 - Never stop taking medication when feeling worse	66	94.3
M4 - Bring medication when traveling or away from home	60	85.7
M5 - Take medication yesterday	60	85.7

Adherence characteristics according to the MMAS-8 scale	Number of patients	Percentage (%)
M6 - Stop taking medication when under control	62	88.6
M7 - Do not feel hassled about sticking to treatment plan	67	95.7
M8 - Difficulty remembering to take all medications	64	91.4

According to Table 3.2, the majority of patients had a level of treatment adherence from good to high. Most patients showed high adherence rates across the items of the MMAS-8 scale. The highest proportions were observed for not feeling inconvenienced about carrying medication (95.7%) and never stopping medication (94.3%).

Table 3.3. Mean SDSCA scores and levels of self-care according to the SDSCA scale

Level of self-care according to the SDSCA scale	Number of patients	Percentage (%)	
Good	60	85.7	
Moderate	9	12.9	
Poor	1	1.4	
Total	70	100	
Level of self-care performance by behavior domain in the SDSCA scale	Number of patients with good performance	Percentage (%)	
Diet	60	85.7	
Physical activity	38	54.3	
Blood glucose monitoring	12	17.1	
Foot care	47	67.1	
Characteristics of adherence to each behavior according to the SDSCA scale	Mean ($\bar{X} \pm SD$)	Min	Max
SDSCA score	45.99 $\pm$ 9.13	20	60
S1 - Healthy diet	6.43 $\pm$ 0.97	3	7
S2 - Avoid high-sugar foods	6.13 $\pm$ 1.36	0	7
S3 - Follow dietary recommendations	5.80 $\pm$ 1.98	0	7
S4 - Eat meals on schedule as recommended	5.90 $\pm$ 1.98	0	7
S5 - Exercise for at least 30 minutes/day	4.86 $\pm$ 2.34	0	7
S6 - Walking or light physical activity for 30 minutes/day	4.61 $\pm$ 2.38	0	7
S7 - Self-monitoring of blood glucose	1.76 $\pm$ 2.07	0	7
S8 - Daily foot inspection	5.16 $\pm$ 2.54	0	7
S9 - Proper hygiene and drying between toes	5.34 $\pm$ 2.32	0	7

According to Table 3.3, the majority of patients exhibited good self-care behaviors (85.7%). Among these, the behavior domain with the highest performance was diet (85.7%), and the specific behavior with the highest mean score was following a healthy diet (6.43 $\pm$ 0.97 points).

Table 3.4. Association between medication adherence levels (MMAS-8) and several factors

Characteristics		MMAS-8 scale	Good (66 patients)	Not good (4 patients)	P
Gender	Male		30 (90.9)	3 (9.1)	0.337
	Female		36 (97.3)	1 (2.7)	
Age (years)	≤ 75		54 (94.7)	3 (5.3)	0.569
	> 75		12 (92.3)	1 (7.7)	
Educational level	Grade 0, 1, 2 (Primary or lower)		12 (92.3)	1 (7.7)	0.569
	Grade 3 or higher (Upper secondary or higher)		54 (94.7)	3 (5.3)	
Medical service payment capability	Easy		54 (94.7)	3 (5.3)	0.569
	Difficult		12 (92.3)	1 (7.7)	
Living arrangement	Living with family		63 (95.5)	3 (4.5)	0.214
	Living alone		3 (75.0)	1 (25.0)	
Alcohol consumption	Yes		11 (84.6)	2 (15.4)	0.154
	No		55 (96.5)	2 (3.5)	
Smoking status	Yes		13 (86.7)	2 (13.3)	0.199
	No		53 (96.4)	2 (3.6)	
BMI (kg/m ²)	< 23		34 (97.1)	1 (2.9)	0.614
	≥ 23		32 (91.4)	3 (8.6)	
Type of diabetes medication	Oral medications only		29 (96.7)	1 (3.3)	0.630
	Insulin injection, or combination of oral and injection		37 (92.5)	3 (7.5)	
Stroke type	Cerebral hemorrhage		7 (100)	0 (0.0)	0.278
	Cerebral infarction		41 (95.3)	2 (4.7)	
	Unspecified		18 (90.0)	2	

According to Table 3.4, there was no statistically significant association between medication adherence levels according to the MMAS-8 scale and characteristics such as gender, age, educational level, medical service payment capability, living arrangement, alcohol consumption, smoking status, BMI, type of diabetes medication, and stroke type ($p > 0.05$).

Table 3.5. Association between self-care behaviors according to the SDSCA scale and several related factors

Characteristics		SDSCA scale	Good (66 patients)	Not good (4 patients)	P
Gender	Male		26 (78.8)	7 (21.2)	0.173
	Female		34 (91.9)	3 (8.1)	
Age (years)	≤ 75		49 (86.0)	8 (14.0)	1.000
	> 75		11 (84.6)	2 (15.4)	
Educational level	Grade 0, 1, 2 (Primary or lower)		10 (76.9)	3 (23.1)	0.380
	Grade 3 or higher (Upper secondary or higher)		50 (87.7)	7 (12.3)	
Medical service payment capability	Easy		50 (87.7)	7 (12.3)	0.380
	Difficult		10 (76.9)	3 (23.1)	
Living arrangement	Living with family		58 (87.9)	8 (12.1)	0.095
	Living alone		2 (50.0)	2 (50.0)	
Alcohol consumption	Yes		11 (84.6)	2 (15.4)	1.000
	No		49 (86.0)	8 (14.0)	
Smoking status	Yes		14 (93.3)	1 (6.7)	0.687
	No		46 (83.6)	9 (16.4)	
BMI (kg/m ²)	< 23		27 (90.0)	3 (10.0)	0.498
	≥ 23		33 (82.5)	7 (17.5)	
Type of diabetes medication	Oral medications only		30 (85.7)	5 (14.3)	1.000
	Insulin injection, or combination of oral and injection		30 (85.7)	5 (14.3)	
Stroke type	Cerebral hemorrhage		6 (85.7)	1 (14.3)	0.513
	Cerebral infarction		38 (88.4)	5 (11.6)	
	Unspecified		60 (85.7)	10 (14.3)	

According to Table 3.5, there was no statistically significant association between self-care behavior levels according to the SDSCA scale and characteristics such as gender, age, educational level, medical service payment capability, living arrangement, alcohol consumption, smoking status, BMI, type of diabetes medication, and stroke type ($p > 0.05$).

IV. DISCUSSION

4.1. General characteristics of the study subjects

The study was conducted on 70 patients with T2DM concurrent with stroke undergoing inpatient treatment at the Department of Neurology, Thai Nguyen National Hospital, from February 2026 to June 2026. The results showed that the mean age of the study subjects was 67.27 ± 10.82 years, with the youngest being 36 years old and the oldest 91 years old. This finding is consistent with the studies by Duong Mong Lien² and several other authors^{3,4}. Female patients accounted for 52.9%, the majority of patients were of Kinh ethnicity (72.9%), and 94.3% lived with their families. Patients residing in urban areas accounted for 58.6%. Most patients had an educational level of upper secondary school or higher (81.4%) and reported that medical service payment was relatively easy (81.4%). The proportions of patients with a BMI $<23 \text{ kg/m}^2$ và $\geq 23 \text{ kg/m}^2$ were comparable (50% each). Cerebral infarction was the predominant stroke subtype (61.4%).

4.2. Status of self-care behaviors and medication adherence among patients with T2DM and concurrent stroke

4.2.1. Status of self-care behaviors

Self-care behaviors play a crucial role in blood glucose control and complication prevention, particularly in patients with T2DM and concurrent stroke. Our study recorded that 85.7% of patients performed good self-care behaviors. This result is significantly higher than the rate of 32.4% reported in the study by Nguyen Thi Kieu Mi⁵. This discrepancy may be attributed to the fact that our study focused on inpatients with T2DM and concurrent stroke treated at the Neurology Department, whereas Nguyen Thi Kieu Mi's study was conducted

on 513 outpatients with T2DM treated in the community in Thua Thien Hue province.

Among self-care behaviors, diet and dietary-related domains achieved the highest mean scores, with patients having a mean number of days adhering to a healthy diet of 6.43 ± 0.97 days/week and actively following a low-sugar diet 6.13 ± 1.36 days/week. Patients performed relatively well in maintaining a healthy diet, limiting foods high in sugar and fat, and adhering to a diabetic diet. This finding is quite consistent with the study by Regufe⁴, which similarly demonstrated that diet was the behavioral domain with high mean scores. However, our result is higher than that of Nguyen Thi Kieu Mi⁵. This can be explained by the fact that inpatients with stroke-complicated diabetes often receive family support in meal preparation and direct dietary instructions from medical staff upon admission. In contrast, for community-based outpatients with T2DM, maintaining a suitable diet may be influenced by family economic conditions, dietary habits, and inconveniences in food selection and preparation.

Regarding physical activity, the study subjects performed at a moderate level, which was lower than several other self-care domains. This finding is consistent with the systematic review by Paudel et al.⁶ and aligns with the assertion by Tan⁷ that impaired mobility, fear of falling, dependence on caregivers, and a lack of community-based rehabilitation programs can hinder the maintenance of physical activity in elderly patients with diabetes. Compared to the study by Nguyen Thi Kieu Mi⁵, our results showed a lower level of physical activity performance. This difference may be partly because our study was conducted on patients with T2DM and concurrent stroke, in whom post-stroke motor

and functional impairments can affect their ability to maintain physical activity

Self-monitoring of blood glucose was the least performed self-care domain in our study, with only 17.1% of patients achieving a good level, and a mean frequency of 1.76 ± 2.07 days/week. Nevertheless, this result remains higher than that reported by Nguyen Thi Kieu Mi⁵, where 99.2% of patients did not perform blood glucose self-monitoring well at home. The author suggested that the primary obstacles were the cost of purchasing glucose meters and test strips, the misconception that stable blood glucose requires no testing, and the habit of checking blood glucose at healthcare facilities during follow-up visits. In patients with T2DM and concurrent stroke, blood glucose self-monitoring may encounter additional difficulties due to motor impairments, visual deficits, and caregiver dependence.

Foot care was performed well by 67.1% of patients, which was higher than blood glucose self-monitoring but lower than dietary management. This result is more positive than the study by Nguyen Thi Kieu Mi⁵, in which the mean number of foot care days was 3.24 days/week, with 64.5% not regularly inspecting their feet and 75.0% not regularly checking their shoes before wearing them. Our positive findings may be related to the fact that patients were receiving inpatient treatment for stroke, benefiting from family support and direct guidance from medical staff.

4.2.2. Status of medication adherence

One of the prominent findings of this study is that 94.3% of patients had a very good or good level of treatment adherence, with 52.9% achieving a very good level and 41.4% a good level. This result is considerably higher than that of the study by Le Chuyen et al.³, in which the

rate of treatment adherence among patients at baseline was 63.4% and increased to 73.7% after 3 months of intervention. This difference may be related to sample characteristics and sample size. Our study focused on patients with T2DM and concurrent stroke, whereas Le Chuyen et al.'s study was conducted on patients with T2DM in general. In addition, our sample size was considerably smaller, meaning the results may be more influenced by the specific characteristics of the study sample. Across individual items of the MMAS-8 scale, the majority of patients achieved good adherence rates of over 85%. The highest-ranking criteria were not feeling inconvenienced about carrying medication (95.7%), followed by never stopping medication (94.3%) and having no difficulty remembering to take medications (91.4%). However, 25.7% of patients still occasionally forgot to take their medication. This is an issue requiring attention because prolonged forgetfulness can impair blood glucose control and increase the risk of cardiovascular complications as well as stroke recurrence.

4.2.3. Factors associated with self-care behaviors and medication adherence among patients with T2DM and concurrent stroke

The analysis of the association between self-care behaviors and medication adherence levels with demographic characteristics, lifestyle habits, and clinical features revealed no statistically significant differences ($p > 0.05$). This indicates that awareness as well as practices regarding treatment adherence and self-care among post-stroke diabetes patients were relatively uniform and independent of background factors and treatment modalities. Notably, living arrangement showed a difference approaching statistical significance regarding self-care behavior ($p = 0.095$), with the group living with

family having a markedly higher rate of good self-care (87.9%) than the group living independently (50.0%), reflecting the crucial companionship role of family members in the recovery and management of chronic diseases following a stroke. This result differs from the studies by Duong Mong Lien² and Nguyen Van Trung et al.⁸, in which advanced age and low educational level were associated with poorer self-care. This discrepancy may be related to the characteristics of inpatient treatment, where patient care, medication administration, and dietary regimens are relatively uniformly supervised. Furthermore, the small sample size and high rates of self-care and medication adherence (>85%) may reduce the statistical power to detect associations.

V CONCLUSION

Patients with T2DM and concurrent stroke generally exhibited good levels of self-care behaviors and medication adherence. Among self-care behaviors, diet and foot care were performed relatively well, whereas physical activity and particularly self-monitoring of blood glucose remained limited. Very good and good levels of medication adherence accounted for high proportions. No statistically significant association was observed between demographic characteristics, lifestyle habits, or clinical features and the levels of self-care and medication adherence.

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