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# SURVEY OF MEDICATION ADHERENCE AND ASSOCIATED FACTORS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT SAINT-PAUL GENERAL HOSPITAL IN 2025

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## ABSTRACT

**Objective:** *To assess the level of medication adherence and associated factors among patients with type 2 diabetes mellitus.*

**Subjects and methods:** *A descriptive cross-sectional study was conducted among 279 patients with type 2 diabetes mellitus who were examined and treated at Saint-Paul General Hospital from June to December 2025. Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8). Associated factors were identified using multivariable binary logistic regression analysis.*

**Results:** *The proportions of patients with good, moderate, and poor medication adherence were 28.0%, 41.2%, and 30.8%, respectively. The most common non-adherent behavior was occasionally forgetting to take blood glucose-lowering medication (68.1%). Multivariable binary logistic regression analysis showed four factors independently associated with medication adherence. The adherence rate among patients using insulin was significantly lower than that among those not using insulin (aOR = 0.287; 95% CI: 0.134-0.612; p = 0.001). Patients who achieved blood glucose targets, HbA1c control, and engaged in physical exercise had significantly higher adherence rates than those who did not achieve blood glucose targets (aOR = 3.306; 95%CI: 1.316-8.306; p = 0.011), had HbA1c ≥ 7% (aOR = 0.058; 95% CI: 0.007-0.481; p = 0.008), and did not engage in physical exercise (aOR = 5.620; 95% CI: 2.194-14.396; p < 0.001).*

**Conclusions:** *Patients with type 2 diabetes mellitus examined and treated at Saint-Paul General Hospital had a relatively low rate of medication adherence. Insulin use, blood glucose control, HbA1c control, and physical activity were independent factors associated with medication adherence. Strengthened counseling, health education, and adherence-support interventions are needed for patients.*

**Keywords:** Type 2 diabetes mellitus, medication adherence, Morisky 8-item Medication Adherence Scale.

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## 1. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a public health issue, with an increasing prevalence worldwide. In 2019, the global prevalence of diabetes mellitus among adults was estimated at 9.3% (463 million people), and it is projected to increase to 10.9% (700 million people) by 2045. Half of all people with diabetes mellitus remain undiagnosed or are unaware of their condition. In 2021, one in ten adults was living with diabetes mellitus [1]. In Vietnam, health statistics show that deaths due to non-communicable diseases increased from 44.07% in 1976 to 73.41% in 2015, whereas deaths due to communicable diseases decreased from 53.06% to 11.4% during the same period. In 2017, the age-standardized prevalence of diabetes mellitus was estimated at nearly 6%, and diabetes mellitus was projected to be among the seven leading causes of death or disability in Vietnam by 2030 [2].

Medication adherence is defined as the extent to which a patient's behavior corresponds with agreed recommendations from healthcare providers. Non-adherence to medication leads to unfavorable outcomes and financial burden. Unlike causes of death such as myocardial infarction or cancer, the consequences of medication non-adherence are often difficult for patients, families, and healthcare workers to recognize [3].

Based on this practical context, we conducted this study to assess medication adherence and

identify selected factors associated with medication adherence among patients with T2DM at Saint-Paul General Hospital.

## 2. SUBJECTS AND METHODS

### 2.1. Subjects

A total of 279 patients aged ≥ 18 years with T2DM who were treated at Saint-Paul General Hospital from June to December 2025 were included.

Exclusion criteria included gestational diabetes mellitus; inability to communicate normally; presence of selected severe acute or chronic comorbidities or current use of medications affecting diabetes treatment outcomes; and refusal by the patient or the patient's family member to participate in the study.

### 2.2. Methods

- Study design: descriptive cross-sectional study.

- Diagnosis of T2DM: based on the 2026 criteria of the American Diabetes Association (ADA) [4].

- Sample size: calculated using the formula for estimating a proportion in a finite population (in which, n is the required number of patients; p is the proportion of patients with medication adherence. According Nguyen Thi Phuong Thuy at Dong Da General Hospital [5], the non-adherence rate was 30% (95% CI: 27.2-38.6); at a 95% confidence level, $Z_{1-\alpha/2}$ = 1.96; and d = 5% was the acceptable margin of error).

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

Applying the formula yielded a required sample size of 268. In our study, the actual sample size was 279 patients.

- Data collection method: medication adherence was assessed using the Morisky scale questionnaire [3], consisting of three sections:

+ Questions related to sociodemographic factors such as age, sex, religion, social class, and educational level.

+ Questions on medical history related to diabetes mellitus, current comorbidities, and personal history such as smoking/alcohol consumption.

+ Questions related to medication adherence using the MMAS-8.

Adherence was classified as follows: good adherence (MMAS = 8 points), moderate adherence (MMAS from 6 to less than 8 points), and poor adherence (MMAS < 6 points).

- Implementation: the questionnaire was pilot-tested on 28 patients (10% of the total sample size) before formal data collection. Selected factors associated with medication adherence were identified using multivariable logistic regression analysis.

- Classification/evaluation criteria used in the study: diagnosis of T2DM according to ADA 2026 [4]; blood pressure classification according to the 2024 European Society of Cardiology Guidelines (ESC 2024) [6].

- Ethics: the study was approved by the Scientific Council of Dai Nam University (Decision No. 1634/QD-DN, dated 16/12/2025). All patient information was kept confidential and used only for research purposes.

- Data analysis: data were analyzed using SPSS version 26.0. Categorical variables were expressed as frequencies and percentages. Associations between two groups were assessed using the Chi-square test or Fisher's exact test. Binary logistic regression analysis was performed to eliminate confounding factors in predicting medication non-adherence. Differences between variables were considered statistically significant at $p < 0.05$. Variables significant in univariate analysis were entered into the multivariable logistic regression model. Crude and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were reported.

## 3. RESULTS

**Table 1. Sociodemographic characteristics of patients**

| Characteristics | | Number of patients (n = 279) | Percentage (%) |
|---|---|---|---|
| Sex | Male | 131 | 47.0 |
| | Female | 148 | 53.0 |
| Age (years) | Mean ± SD | 71.77 ± 8.58 | |
| | < 60 | 15 | 5.4 |
| | ≥ 60 | 264 | 94.6 |

| Characteristics | | Number of patients (n = 279) | Percentage (%) |
|---|---|---|---|
| Educational level | College/university, postgraduate | 65 | 23.3 |
| | Other | 214 | 76.7 |
| Duration of diabetes mellitus (years) | < 5 | 68 | 24.4 |
| | ≥ 5 | 211 | 75.6 |
| BMI (kg/m²) | < 25 | 228 | 81.7 |
| | ≥ 25 | 51 | 18.3 |

Table 1 shows that the proportion of female patients (53.0%) was higher than that of male patients (47.0%). The mean patient age was 71.77 ± 8.58 years, and most patients were aged 60 years or older (94.6%). A total of 23.3% of patients had a college/university or postgraduate educational level. Most patients had had diabetes mellitus for ≥ 5 years (75.6%).

**Table 2. Behavioral, clinical, and laboratory characteristics**

| Characteristics | Number of patients (n = 279) | Percentage (%) |
|---|---|---|
| Insufficient physical activity | 150 | 53.8 |
| Healthy diet | 146 | 52.3 |
| Alcohol consumption | 52 | 18.6 |
| Hypertension | 262 | 93.9 |
| Insulin use | 87 | 31.2 |
| Use of ≥ 2 drug classes | 177 | 63.4 |
| HbA1c ≥ 7% | 162 | 58.1 |
| Comorbidities | 174 | 62.4 |
| No self-monitoring of blood glucose at home | 149 | 53.4 |

The most prominent clinical feature was hypertension (93.9%). The proportions of patients with insufficient physical activity, use of ≥ 2 drug classes, HbA1c ≥ 7%, and comorbidities were all above 50% (53.8%, 63.4%, 58.1%, and 62.4%, respectively). A total of 31.2% of patients used insulin.

**Table 3. Characteristics of individual components of the MMAS-8 medication adherence questionnaire**

| No. | MMAS-8 question | Yes (n = 279) | Percentage (%) |
|---|---|---|---|
| 1 | Sometimes forgets to take blood glucose-lowering medication | 190 | 68.1 |
| 2 | Had at least one day in the past two weeks without taking blood glucose-lowering medication | 24 | 8.6 |
| 3 | Has ever reduced/stopped medication without informing the physician because of feeling worse when taking the medication | 32 | 11.5 |
| 4 | Sometimes forgets to bring medication when traveling or leaving home | 81 | 29.0 |
| 5 | Took blood glucose-lowering medication yesterday | 267 | 95.7 |
| 6 | When feeling that blood glucose is controlled, sometimes stops taking diabetes medication | 35 | 12.5 |
| 7 | Feels inconvenienced by having to follow the treatment plan | 59 | 21.1 |
| 8 | Has difficulty remembering to take all blood glucose-lowering medications | 59 | 21.1 |

The most common non-adherent behaviors were occasionally forgetting to take blood glucose-lowering medication (68.1%) and forgetting to bring medication when traveling (29.0%). Other behaviors accounted for lower proportions (8.6-21.1%). A total of 95.7% of patients reported taking their medication on the previous day.

**Table 4. Level of medication adherence according to MMAS-8**

| Medication adherence | Number of patients | Percentage (%) |
|---|---|---|
| Good | 78 | 28.0 |
| Moderate | 115 | 41.2 |
| Poor | 86 | 30.8 |
| Total | 279 | 100 |

Most patients had moderate or poor medication adherence (72.0%); only 28.0% had good medication adherence.

**Table 5. Factors associated with medication adherence**

| Independent variable | aOR | 95%CI | p |
|---|---|---|---|
| Sex | 1.056 | 0.519-2.151 | 0.881 |
| Educational level | 1.517 | 0.384-5.985 | 0.552 |
| Duration of disease ≥ 5 years | 0.735 | 0.287-1.880 | 0.520 |
| Comorbidities | 1.064 | 0.470-2.409 | 0.881 |
| Dietary adherence | 1.817 | 0.794-4.158 | 0.157 |
| Number of drug classes < 2 | 2.101 | 0.893-4.944 | 0.089 |
| Insulin use | 0.287 | 0.134-0.612 | 0.001 |
| Blood glucose < 7 | 3.306 | 1.316-8.306 | 0.011 |
| HbA1c ≥ 7 | 0.058 | 0.007-0.481 | 0.008 |
| Physical exercise/sports | 5.620 | 2.194-14.396 | < 0.001 |
| Age group ≤ 60 years | 1.127 | 0.227-5.584 | 0.884 |

Multivariable binary logistic regression analysis showed four factors independently associated with medication adherence. The adherence rate among patients using insulin was significantly lower than that among those not using insulin (aOR = 0.287; 95% CI: 0.134-0.612; p = 0.001). Patients who achieved blood glucose targets, HbA1c control, and engaged in physical exercise had significantly higher adherence rates than those who did not achieve blood glucose targets (aOR = 3.306; 95% CI: 1.316-8.306; p = 0.011), had HbA1c ≥ 7% (aOR = 0.058; 95% CI: 0.007-0.481; p = 0.008), and did not engage in physical exercise (aOR = 5.620; 95% CI: 2.194-14.396; p < 0.001). The remaining variables showed no statistically significant differences.

## 4. DISCUSSION

The results in Table 4 show that 69.2% of patients had good or moderate medication adherence, including 41.2% with moderate adherence and 28.0% with good adherence. This finding is similar to the study by Pham Thi Lam Phuong [7] at Hanoi Medical University Hospital (73.5%) and that by Ly Chi Thanh [8] in My Xuyen Ward, Can Tho (71.2%). It is higher than the findings reported by Tran Thi Thuy Nhi et al. [9] in Lam Dong (63.4%) and Sharma T. [10] (16.6%); but lower than those reported by Nguyen Kim Thuy in Ho Chi Minh City in 2021 [11] (medication adherence: 85.8%; physical activity: 55.8%; nutrition: 69%), Phan Thanh Hung et al. [12] (medication adherence rate: 77%), and Pham Thi Hoang Yen [13] (88.2% of study participants had good or moderate medication adherence). The study by Pattnaik et al. [14] recorded that only 9.7% of study participants had low medication adherence. Differences in medication adherence rates may be due to differences in study settings, sociodemographic variables, and assessment tools. Medication adherence is an important factor that directly affects the treatment effectiveness of chronic diseases, including T2DM. Medication non-adherence may lead to failure in blood glucose control, reduced quality of life, and an increased risk of complications.

The results in Table 5 show that patients with good medication adherence achieved blood glucose and HbA1c targets at significantly higher rates than those with poor medication adherence. This is consistent with the findings of Pham Thi Lam Phuong [7] at Hanoi Medical University Hospital, where patients who achieved the treatment target (HbA1c < 7%) had higher medication adherence than those who did not achieve the treatment target (OR = 1.568; p < 0.01). The results in Table 3 show that the most common manifestation of medication non-adherence was occasionally forgetting to take blood glucose-lowering medication (68.1%), which is consistent with the study by Ly Chi Thanh [8] in My Xuyen Ward, Can Tho (67.6%).

Several studies in Vietnam and abroad have identified factors associated with medication adherence. The study by Venkatesan [15] showed that the likelihood of poor adherence was 1.6 times higher (1.04–2.5) among patients with hypertension.

The study by Jyotiranjan Sahoo [16] indicated that a family history of diabetes mellitus, comorbidities, and alcohol consumption increased the likelihood of poor adherence by 1.88, 3.26, and 2.35 times, respectively. Nguyen Kim Thuy [11] found that sex, occupation, educational level, marital status, duration of diabetes treatment, and comorbidities were associated with medication adherence. Phan Thanh Hung et al. [12] showed associations between age, educational level, duration of disease, and medication adherence. Specifically, patients aged over 60 years had an odds ratio (OR) for medication adherence 2.06 times higher than that of patients aged under 60 years; patients with an educational level above upper secondary school had an OR for medication adherence 2.24 times higher; and patients with a disease duration of more than 5 years had an OR for adherence 1.775 times higher. The findings of Pham Thi Lam Phuong [7] at Hanoi Medical University Hospital showed that careful counseling and explanations about medication by healthcare workers were key factors for medication adherence among patients undergoing treatment (OR = 3.757). Patients who received explanations had a much higher adherence rate (76.3%) than those who did not (46.2%).

In this study, through multivariable binary logistic regression analysis, we found that factors significantly associated with diabetes medication adherence included insulin use (aOR = 0.287; p = 0.001), blood glucose (aOR = 3.306; p = 0.011), HbA1c (aOR = 0.058; p = 0.008), and physical exercise/sports (aOR = 5.620; p < 0.001) (Table 5). Blood glucose control is a key component in diabetes treatment. HbA1c is currently regarded as a standard indicator for evaluating long-term blood glucose control and the risk of complications. In this study, 58.1% of patients had HbA1c ≥ 7%, indicating a high proportion of patients with blood glucose control not meeting the target; this is consistent with the study by Pham Thi Lam Phuong [7], in which two-thirds of the study participants (77.1%) had HbA1c ≥ 7%. Poor HbA1c control is associated with poor medication adherence. Therefore, regular monitoring of blood HbA1c levels in patients with diabetes mellitus is necessary to better manage their medication adherence.

Adequate physical activity is very important in the treatment of patients with T2DM. The findings of this study, as well as those of Tran Thi Thuy Nhi [9], confirm that physical activity is closely associated with medication adherence among patients with diabetes mellitus. Physical activity plays an important role in adherence to diabetes treatment by improving blood glucose control, reducing cardiovascular risk factors, and contributing to weight loss. Therefore, physical activity recommendations should be individualized according to each patient's physical condition, age, and comorbidities to improve treatment effectiveness.

Adherence to insulin therapy among patients with T2DM is a key factor in controlling blood glucose and preventing complications. In this study, patients using insulin had poorer adherence than those not using insulin. Possible reasons include fear of injections, fear of pain, and fear of hypoglycemia. In addition, some patients believe that the need for insulin injection means that treatment has already failed. In Vietnam, the rate of adherence to insulin therapy ranges from approximately 65% to 68%, whereas international rates vary more widely, from 27% to 72% [17]. This indicates the need to strengthen counseling, health education, and instruction on insulin injection techniques to improve medication adherence and the effectiveness of blood glucose control among patients with T2DM.

## 5. CONCLUSION

A study of 279 patients with type 2 diabetes mellitus who were examined and treated at Saint-Paul General Hospital showed the following results:

The proportion of patients with good adherence to diabetes medication was relatively low (28.0%). The most common manifestation of medication non-adherence was occasionally forgetting to take blood glucose-lowering medication (68.1%).

Multivariable logistic regression analysis showed four factors independently associated with medication adherence among patients, including insulin use, which reduced the likelihood of adherence, and achieving blood glucose targets, good HbA1c control, and adequate physical activity, which increased the likelihood of adherence.

These findings demonstrate the need to improve medication adherence among patients with T2DM. Further research is also needed on educational strategies, improvement of awareness among patients with diabetes mellitus, support for physical activity, and effective control of blood glucose and HbA1c levels, especially among patients with diabetes mellitus who receive insulin injections.

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