Journal of Public Health Sciences
Vol. 5, No. 03, pp. 790-806
journal.iistr.org/index.php/JPHS
DOI: 10.56741/IISTR.jphs.002293

Self-Management and Adherence to Routine Health Monitoring among Patients with Type 2 Diabetes Mellitus in the Service Area of Primary Health Care Center X

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ARTICLE INFO

Article history
Received 11 May 2026
Revised 7 September 2026
Accepted 24 September 2026

ABSTRACT

Type 2 Diabetes Mellitus (T2DM) requires long-term management through effective self-management and health monitoring. Poor self-management and irregular monitoring may result in uncontrolled blood glucose and increased complications. This study aimed to describe self-management and adherence to health monitoring among patients with T2DM in Primary Health Care Center X, Surakarta, Indonesia, and identify the strongest and weakest self-management dimensions. A descriptive quantitative cross-sectional study was conducted from March to April 2026 involving 324 patients with T2DM recruited through purposive sampling. Data were collected using a demographic questionnaire, the Summary of Diabetes Self-Care Activities (SDSCA), and a health monitoring adherence questionnaire based on primary health care standards and Prolanis guidelines. Data were analyzed using descriptive statistics. From this study, most respondents were aged 56–69 years (69.8%), male (62.7%), worked in the informal sector (75.0%), and had diabetes for 5–8 years (72.5%). Complications were reported by 75 respondents (23.1%), 65 (20.1%) were enrolled in Prolanis, and 148 (45.7%) had a history of smoking and/or obesity. Overall self-management was moderate (54.3%). Medication adherence was strongest (mean = 5.8 days/week, SD = 1.4), whereas physical activity, blood glucose self-monitoring, and foot care were weakest (means = 2.3, 2.8, and 2.1 days/week). Monitoring adherence

was suboptimal, with 222 respondents (68.5%) non-adherent. Monitoring focused mainly on blood glucose testing (75%), while HbA1c testing (8%) and complication screening (5%) were rarely performed. These findings highlight self-management was moderate, whereas monitoring adherence remained low. Strengthening education and follow-up monitoring systems is recommended to improve diabetes management in primary health care.

Keywords
Community Nursing
Primary Health Care
Routine Health Monitoring
Self-Management
Type 2 Diabetes Mellitus

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Introduction

Type 2 Diabetes Mellitus (T2DM) is one of the most prevalent chronic metabolic diseases and remains a major global public health challenge due to its continuously increasing prevalence in both developed and developing countries. The rising burden of T2DM has significantly affected health systems and communities, contributing to substantial healthcare costs, reduced productivity, and increased long-term disease management demands [1], [2]. As a non-communicable disease with long-term consequences, T2DM requires comprehensive and continuous care to prevent disease progression and related complications [3].

T2DM has a considerable impact on patients' quality of life due to its progressive nature and its association with various chronic complications, including cardiovascular disease, nephropathy, retinopathy, and neuropathy. These complications are major contributors to morbidity and mortality and may significantly impair physical functioning, psychosocial well-being, and overall productivity [2]. Therefore, effective diabetes management is essential not only to control blood glucose levels but also to reduce the risk of disability and improve long-term health outcomes [4].

Self-management is a fundamental component of T2DM care, involving daily behaviors performed by patients to control and manage their condition. Key self-management activities include dietary regulation, physical activity, medication adherence, blood glucose monitoring, foot care, and stress management. Consistent self-management practices have been shown to support better glycemic control and reduce the likelihood of long-term complications [5], [6]. In addition to self-management, adherence to routine health monitoring through regular follow-up visits and clinical assessments such as HbA1c measurement, blood pressure evaluation, and complication screening is essential to assess disease control and ensure timely therapeutic adjustments [1], [7], [8].

Despite the importance of these strategies, many T2DM patients still demonstrate suboptimal self-management behaviors, particularly in lifestyle-related components such as physical activity and regular self-monitoring of blood glucose [9]. This condition may result in poor glycemic outcomes and increase the risk of preventable complications [1]. Similarly, adherence to routine health monitoring in primary healthcare settings remains a challenge. Previous studies have reported that follow-up attendance is often inconsistent and is influenced by multiple factors such as health literacy, family support, accessibility of services, and patient motivation [10]. Low adherence to routine monitoring may lead to delayed detection of complications and inadequate disease control, further increasing the burden of diabetes on individuals and healthcare systems [11].

In Indonesia, primary healthcare centers play a crucial role in delivering chronic disease management programs, including diabetes education and follow-up services. However, descriptive evidence regarding the actual levels of self-management and routine health monitoring adherence among T2DM patients in specific primary healthcare service areas remains limited, and context-specific validated measurement approaches for this population are still being developed [12]. Most previous research has focused on analytical approaches exploring determinants or causal relationships, while fewer studies provide a comprehensive descriptive overview of patient self-management and monitoring behaviors at the primary care level [13]. Moreover, local context including socioeconomic conditions, cultural practices, and healthcare access may influence diabetes management behaviors, highlighting the need for setting-specific data to support effective intervention planning [2], [14].

The limited availability of descriptive evidence may hinder the development of targeted diabetes education strategies and community-based intervention programs that are aligned with patient needs. Therefore, this study was conducted to describe the level of self-management and adherence to routine health monitoring among T2DM patients in the service area of Primary Health Care Center X. Additionally, this study sought to identify the strongest and weakest self-management dimensions to support priority-setting for educational interventions [1], [15].

The findings of this study are expected to provide practical evidence for Primary Health Care Center X in strengthening diabetes management services, including educational programs and follow-up monitoring strategies. Furthermore, the results may support community nurses in designing more targeted promotive and preventive interventions and improving community-based chronic disease programs such as Prolanis. Ultimately, this study contributes to the development of evidence-based strategies to enhance diabetes self-management and improve routine health monitoring adherence among T2DM patients in primary healthcare settings.

Material and Methods

This study employed a descriptive quantitative cross-sectional design to describe the level of self-management and adherence to routine health monitoring among patients with Type 2 Diabetes Mellitus (T2DM) [16]. Data were collected at one point in time without intervention. The study was conducted in the service area of Primary Health Care Center X, Surakarta, Indonesia. Data collection was carried out from March to April 2026. The target population consisted of all registered T2DM patients receiving services at Primary Health Care Center X, Surakarta. A total of 324 respondents were recruited in this study using purposive sampling, based on eligibility criteria and willingness to participate [7].

The majority of respondents were aged 56–69 years. Male respondents accounted for 203 participants, while 121 were female. Most respondents worked in informal sectors such as traders, farmers, private employees, and other occupations (243 respondents, 75%), while 81 respondents (25%) were civil servants or retired. The duration of diabetes among respondents was predominantly 5–8 years. Furthermore, 75 respondents reported a history of diabetes-related complications, 65 respondents were enrolled in the chronic disease management program (Prolanis), and 148 respondents had a history of smoking and/or obesity.

Respondents were included if they (1) had a confirmed diagnosis of T2DM, (2) were aged ≥18 years, (3) were registered at Primary Health Care Center X Surakarta, and (4) agreed to participate by signing informed consent. Respondents were excluded if they (1) had communication or cognitive impairments preventing questionnaire completion, (2) had severe complications limiting participation, or (3) submitted incomplete questionnaires.

The main variables assessed in this study were self-management among T2DM patients and adherence to routine health monitoring (routine follow-up and clinical monitoring compliance). Self-management was defined as the patient's daily diabetes self-care behaviors, including dietary management, physical activity, medication adherence, self-monitoring of blood glucose, foot care, and stress management. Total self-management scores were categorized into three consistent levels used throughout this manuscript good, moderate, and poor [13], [17].

Adherence to routine health monitoring was defined as the regularity of respondents in attending scheduled follow-up visits and undergoing recommended routine clinical monitoring, including blood glucose/HbA1c testing, blood pressure assessment, and complication screening (eye, kidney, and foot examination). Adherence was categorized into two consistent levels adherent and non-adherent.

A. Instruments

Data were collected using three instruments.

1. A demographic and clinical characteristics questionnaire covering age, sex, education, occupation, duration of diabetes, history of complications, Prolanis participation, and history of smoking/obesity [18]. Smoking history was defined as any history of cigarette smoking (active or former smoker) within the past 5 years. Obesity was defined as a body mass index (BMI) ≥ 25 kg/m^2, based on the Asian-specific BMI cut-off for obesity recommended by the WHO expert consultation for Asian populations. For the purpose of this descriptive analysis, smoking and obesity were recorded as a single combined behavioral risk indicator ("history of smoking and/or obesity") in the original data collection form, reflecting the presence of at least one of these two risk factors. The combined indicator was coded as "Yes" if the respondent reported either current/former smoking or BMI ≥ 25 kg/m^2, and "No" if neither condition was present.
2. The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire was used to assess diabetes self-management behaviors [6]. The SDSCA core instrument consists of 11 items distributed across six self-care dimensions: general diet (2 items), specific diet (2 items), physical activity/exercise (2 items), self-monitoring of blood glucose/SMBG (2 items), foot care (2 items), and smoking status (1 item). For each item, respondents reported the number of days, out of the past seven days, on which the behavior was performed (response range 0–7 days). Dimension scores were computed as the mean of the constituent items, yielding a possible range of 0–7 per dimension, with higher scores indicating better self-care practice; this is consistent with the 0–7 score range shown on the x-axis of Fig. 1. The Indonesian version of the SDSCA used in this study was adapted and validated by Azmiardi [12], who conducted translation, cultural adaptation, and psychometric testing of the SDSCA among patients with type 2 diabetes in Indonesian primary care settings. The adaptation process included forward-backward translation, expert review, and pilot testing. In this study, the instrument was pilot-tested on 30 respondents prior to the main data collection, with satisfactory validity and reliability results as reported below. In addition to the standard SDSCA items, three items assessing stress management were added based on the diabetes self-management literature. These items measured stress recognition (1 item), relaxation techniques (1 item), and seeking social support (1 item), each rated on a 0–7-day frequency scale. The stress management subscale demonstrated acceptable reliability (Cronbach's $\alpha = 0.75$). The complete questionnaire is provided as supplementary material. [19]
3. A routine health monitoring adherence questionnaire developed by the researcher based on Indonesian primary health care service standards and Prolanis chronic-disease monitoring guidelines. The instrument consists of 12 items covering

attendance at scheduled follow-up visits (4 items) and completion of recommended clinical examinations (8 items), including blood glucose testing (random/fasting), HbA1c testing, blood pressure assessment, eye examination, kidney function screening (serum creatinine/eGFR), foot examination, lipid profile, and urine protein test. Each item uses a "Yes/No" response format indicating whether the respondent had undergone each examination in the past 12 months. The total adherence score ranges from 0 to 12, with higher scores indicating better adherence. Respondents were classified as "adherent" if they scored ≥ 8 (completed at least 8 of the 12 recommended examinations) and "non-adherent" if they scored < 8. This cut-off was determined based on the minimum recommended monitoring schedule from the Prolanis guidelines (at least 6–8 examinations annually) and clinical judgment regarding adequate follow-up frequency. Sample items include: "Have you had your blood glucose checked in the past 12 months?" and "Have you had your HbA1c checked in the past 12 months?" The complete questionnaire is provided as supplementary material.

B. Validity and Reliability

Instrument validity was assessed through content validity, evaluated by 3 expert validators with expertise in endocrine nursing, clinical nutrition, and public health; the content validity index (CVI) obtained was 0.89 (scale-level CVI/Ave), with individual item CVI ranging from 0.80 to 1.00. Construct validity was examined using the Pearson product-moment item-total correlation test on a pilot/try-out sample of 30 respondents, with item-total correlation coefficients ranging from 0.412 to 0.758; two items with r below the applied threshold ($r < 0.30$) were revised or removed prior to the main data collection [20].

Reliability was assessed using Cronbach's alpha, with an instrument considered reliable if $\alpha \geq 0.70$. The Cronbach's alpha obtained was 0.84 for the overall SDSCA questionnaire, and 0.78, 0.76, 0.81, 0.79, 0.82, and 0.75 for general diet, specific diet, physical activity, SMBG, foot care, and stress management, respectively, and 0.81 for the routine health monitoring adherence questionnaire, based on a reliability testing sample of 30 respondents.

C. Procedures

Data collection was conducted after obtaining permission from relevant institutions and Primary Health Care Center X. The study objectives, procedures, risks, and benefits were explained to each participant, and written informed consent was obtained prior to participation. Respondents completed the questionnaires independently, with assistance provided when necessary. Completed questionnaires were checked for completeness before data entry.

Data were analyzed using descriptive (univariate) statistical analysis. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized

using mean, median, and standard deviation. Results are presented in tables and figures, supported by a narrative description of respondent characteristics, self-management levels, and adherence to routine health monitoring.

D. Ethical Considerations

This study was conducted in accordance with ethical principles for human research. Ethical approval (ethical clearance) was obtained from the Komite Etik Penelitian Kesehatan Universitas Kusuma Husada Surakarta, under approval number No. 012/KEPK-UKH/II/2026, dated 20 February 2026. Respondent confidentiality was maintained through the use of anonymous codes instead of personal identifiers. Participation was voluntary, and respondents retained the right to withdraw at any time without affecting their access to health services. No invasive procedures were performed, and the study posed minimal risk to participants.

Results

A. Characteristics of Respondents

This study involved 324 respondents with type 2 diabetes mellitus in the service area of Primary Health Care Center X, Surakarta. The demographic and clinical characteristics of the respondents are summarized in Table 1.

Table 1. Demographic and clinical characteristics of respondents (N=324)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group	45–55 years	98	30.2
	56–69 years	226	69.8
Gender	Male	203	62.7
	Female	121	37.3
Education	Bachelor's Degree	194	60.0
	Senior High School or below	130	40.0
Occupation	Informal sector (trader, farmer, etc.)	243	75.0
	Civil servant / retired	81	25.0
Duration of Diabetes	1–4 years	89	27.5
	5–8 years	235	72.5
History of Complications	Yes	75	23.1
	No	249	76.9
Prolanis Participation	Yes	65	20.1
	No	259	79.9
History of Smoking/Obesity*	Yes	148	45.7
	No	176	54.3

**Smoking history and obesity were recorded as a single combined indicator in this study; readers should note that these represent two related but distinct risk behaviors (see Methods).*

Table 1 indicates that the majority of respondents belonged to the older age group (56–69 years) and were male. This finding is consistent with the epidemiological profile of type 2 diabetes, which is frequently diagnosed in older adults. The predominance of respondents working in the informal sector (75%) and those with a history of smoking or obesity (45.7%) highlights significant behavioral and socioeconomic risk factors that warrant particular

attention in community nursing interventions. Furthermore, the low participation rate in the Prolanis program (only 20.1%) represents a critical finding that requires further investigation, given the program's important role in enhancing adherence to routine health monitoring.

B. Description of Self-Management Levels

The results showed that the level of self-management among patients with type 2 diabetes varied. Based on the total self-management score, respondents were divided into three categories: good, moderate, and poor. The distribution of self-management levels is presented in Table 2.

Table 2. Distribution of self-management levels among respondents (N=324)

Self-Management Category	Frequency (n)	Percentage (%)
Good	78	24.1
Moderate	176	54.3
Poor	70	21.6

To determine the primary strengths and weaknesses across dimensions, the mean score of each self-management dimension is presented in Fig. 1.

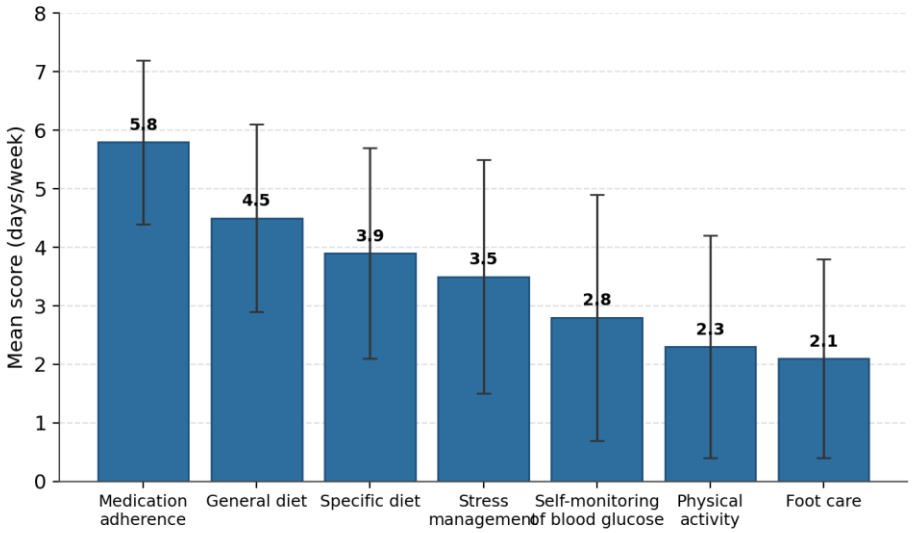

Fig. 1. Mean scores of self-management dimensions among T2DM patients (N=324)

As shown in Table 2, the majority of respondents (54.3%) fell into the moderate self-management category, suggesting that although patients had made efforts toward diabetes care, their self-management practices had not yet reached an optimal level across all dimensions. A more detailed analysis presented in Fig. 1 shows that medication adherence had the highest mean score, at 5.8 days per week, with a standard deviation (SD) of 1.4, indicating a high level of patient awareness and adherence to prescribed pharmacological therapy. General diet was the next most consistently performed behavior, with a mean score of 4.5 days per week (SD = 1.6), followed by specific diet, with a mean score of 3.9 days per week (SD = 1.8). Stress management demonstrated a moderate level of engagement, with a mean score of

3.5 days per week (SD = 2.0). In contrast, lower mean scores were observed for self-monitoring of blood glucose (2.8 days per week; SD = 2.1), physical activity (2.3 days per week; SD = 1.9), and foot care (2.1 days per week; SD = 1.7). These findings underscore the need for future nursing interventions to extend beyond medication adherence by placing greater emphasis on promoting regular physical activity, strengthening self-monitoring of blood glucose practices, and improving routine foot care to reduce the risk of diabetes-related complications.

C. Description of Adherence to Routine Health Monitoring

The analysis showed that the level of adherence to routine health monitoring among patients with type 2 diabetes mellitus varied considerably. The overall adherence category is presented in Table 3, and the distribution of examination types is presented in Table 4 and Fig. 2.

Table 3. Adherence to routine health monitoring (N=324)

Adherence Category	Frequency (n)	Percentage (%)
Adherent	102	31.5
Non-Adherent	222	68.5

Table 4. Proportion of respondents who completed each type of routine health examination in the past 12 months (N=324)

Type of Routine Health Examination	Frequency (n)	Percentage (%)
Blood Glucose Testing (random/fasting)	243	75.0
Blood Pressure Check	198	61.1
HbA1c Test	78	24.1
Eye Examination	52	16.0
Kidney Function Screening (serum creatinine/eGFR)	45	13.9
Foot Examination	36	11.1
Lipid Profile	26	8.0
Urine Protein Test	18	5.6

Note: Respondents may have completed multiple types of examinations; therefore, percentages do not sum to 100%. This table presents adherence for each type of examination independently rather than as mutually exclusive categories.

Table 3 shows that the proportion of non-adherent respondents (68.5%) was substantially higher than that of adherent respondents (31.5%). This finding is concerning, as it indicates that most patients did not undergo routine health monitoring as recommended. Table 4 and Fig. 2 further support this result, showing that blood glucose testing (random or fasting) was the most frequently reported examination (75.0%), whereas more advanced and critical tests for early detection of complications such as HbA1c testing (24.1%) and complication screening for the eyes, kidneys, and feet (5.6–16.0%) were reported far less frequently.

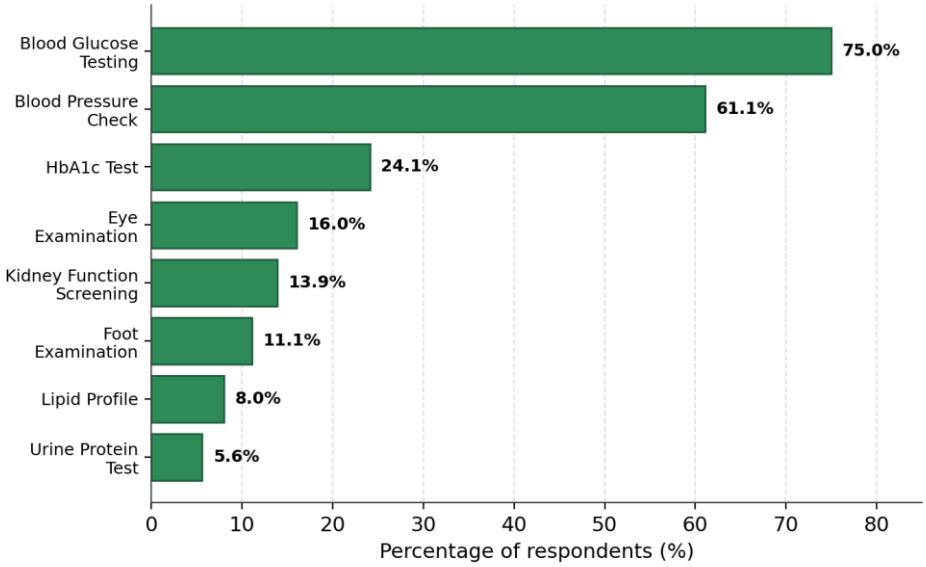

Fig. 2. Types of routine health examinations performed by respondents (N=324)

These findings suggest that both patient understanding and the healthcare delivery system remain primarily focused on short-term glycemic control, while efforts toward long-term complication prevention have not yet become a priority.

D. Bivariate Analysis of Respondent Characteristics with Outcomes

In addition to the primary descriptive analysis, respondent characteristics age group, sex, education, occupation, diabetes duration, complication history, Prolanis participation, and smoking/obesity history were examined in relation to self-management category and adherence category using chi-square tests (for two categorical variables) and an independent t-test (for a categorical predictor against a continuous self-management score). The results are presented in Table 5.

Table 5. Bivariate analysis of respondent characteristics with self-management and adherence outcomes (N=324)

Characteristic	Outcome	Test	Result	Interpretation
Prolanis participation (yes/no)	Adherence category	Chi-square	$\chi^2 = 12.45$, p = 0.001*	Significant: Prolanis participants more likely adherent
Education level (Bachelor vs ≤ Senior High)	Self-management category	Chi-square	$\chi^2 = 8.72$, p = 0.013*	Significant: higher education associated with better self-management
Diabetes duration (1–4 vs 5–8 yrs)	Self-management category	Chi-square	$\chi^2 = 6.33$, p = 0.042*	Significant: longer duration associated with better self-management
Complication history (yes/no)	Adherence category	Chi-square	$\chi^2 = 9.81$, p = 0.002*	Significant: complication history associated with better adherence
Age group (45–55 vs 56–69 yrs)	Self-management category	Chi-square	$\chi^2 = 4.15$, p = 0.126	Not significant

Characteristic	Outcome	Test	Result	Interpretation
Occupation (informal vs formal)	Adherence category	Chi-square	$\chi^2 = 7.24$, $p = 0.007$*	Significant: formal employment associated with better adherence
Prolanis participation (yes/no)	Overall self-management score (continuous)	Independent t-test	$t = 3.82$, $p < 0.001$*	Significant: Prolanis participants had higher self-management scores

*Significant at $p < 0.05$

The bivariate analysis revealed that Prolanis participation, education level, diabetes duration, history of complications, and occupation were significantly associated with self-management and/or adherence outcomes. Prolanis participants demonstrated significantly higher adherence, with 56.9% classified as adherent compared with 22.4% among non-participants ($\chi^2 = 12.45$, $p = 0.001$). Furthermore, Prolanis participants reported significantly higher overall self-management scores, with a mean score of 4.8 (standard deviation SD = 1.2), compared with a mean score of 3.6 (SD = 1.5) among non-participants ($t = 3.82$, $p < 0.001$). Respondents with a history of complications also showed better adherence (38.7% adherent vs. 29.3% non-adherent, $\chi^2 = 9.81$, $p = 0.002$), possibly reflecting an increased perceived need for monitoring and follow-up. Higher education levels (Bachelor's degree) were associated with better self-management (good category: 66.7% among Bachelor's graduates vs. 33.3% among those with ≤ Senior High School, $\chi^2 = 8.72$, $p = 0.013$). Respondents with formal employment demonstrated better adherence than those in the informal sector (42.0% vs. 25.5% adherent, $\chi^2 = 7.24$, $p = 0.007$), likely due to more regular work schedules and access to health insurance. Longer diabetes duration (5–8 years) was associated with better self-management than shorter duration (1–4 years) ($\chi^2 = 6.33$, $p = 0.042$), suggesting that patients may develop better self-management skills over time. Age group did not show a statistically significant association with self-management outcomes in this sample.

Discussion

A. Interpretation of Findings

The findings of this study indicate that the overall level of self-management among patients with T2DM was categorized as moderate, with medication adherence emerging as the most prominent dimension. As shown in Fig. 1, patients demonstrated relatively good adherence to pharmacological therapy but exhibited low scores in physical activity, self-monitoring of blood glucose, and foot care. This pattern suggests that patients tend to prioritize medication as the primary form of disease management, while lifestyle modification and preventive measures against complications remain less emphasized.

The low score in the physical activity dimension may be associated with the demographic characteristics of the respondents (Table 1), most of whom were aged 56–69 years. In this age group, physical limitations and the presence of comorbidities may reduce participation in

regular physical activity. In addition, the low level of self-monitoring of blood glucose suggests that many patients have not yet established the habit of independently monitoring their glucose levels at home [21].

The study also revealed that adherence to routine health monitoring among patients with T2DM remained relatively low (Table 3). The majority of respondents were categorized as non-adherent, indicating that regular medical follow-up is not yet perceived as an essential necessity. The finding that blood glucose testing was the most frequently reported examination (Table 4, Fig. 2), while comprehensive assessments such as HbA1c testing and complication screening were limited, suggests that routine monitoring has not been implemented comprehensively, thereby reducing opportunities for the early detection of diabetes-related complications [22].

B. Comparison with Previous Studies

The findings of this study are consistent with previous studies reporting that self-management among patients with T2DM is generally categorized as moderate, with medication adherence tending to be better than lifestyle-related behaviors [12],[11]. Studies conducted in Indonesia have also demonstrated similar patterns, where patients with T2DM exhibit relatively good medication adherence but remain less compliant with healthy dietary practices and regular exercise [24],[25], [26].

Furthermore, the results of this study are in line with international studies indicating that adherence to routine follow-up visits in primary healthcare facilities remains low [13]. However, this study differs from findings reported in several developed countries, where self-management levels tend to be relatively higher a difference that may be influenced by stronger healthcare systems and better availability of self-monitoring facilities [1].

The findings regarding participation in the Prolanis program in this study also demonstrated a relatively low enrollment rate (Table 1). This differs from studies conducted in several regions reporting that Prolanis participants tend to have better adherence to routine monitoring compared with non-Prolanis patients [27].

C. Possible Explanations for Self-Management and Adherence Patterns

It is important to note that this study used a descriptive cross-sectional design and did not statistically test associations between respondent characteristics and self-management or adherence outcomes prior to the supplementary analysis described above; the interpretations below should therefore be read as plausible explanations grounded in prior literature, considered alongside the bivariate results in Table 5.

First, educational level may be related to self-management. While most respondents had a relatively high educational background (Table 1), the low scores in physical activity and self-monitoring suggest that knowledge alone may not be sufficient to promote positive health

behaviors without adequate motivation and environmental support variables that were not directly measured in this study.

Second, the duration of living with diabetes mellitus (5–8 years) may plausibly relate to self-management behavior. Previous literature suggests that during this stage, patients may experience treatment fatigue a decline in consistency in adhering to long-term therapy due to feelings of boredom or burden although the present study did not directly measure treatment fatigue and cannot confirm this explanation in this sample [28].

Third, occupational factors may play a role. Most respondents worked in the informal sector (Table 1), which generally limits time flexibility because income depends on daily earnings; this is one plausible, literature-based explanation for the high non-adherence rate observed (Table 3).

Fourth, participation in the Prolanis program is another characteristic worth considering. Low participation (20.1%) could plausibly reduce patients' access to routine education, scheduled monitoring, and peer support that might otherwise enhance adherence, consistent with the significant association observed in Table 5.

Fifth, patient motivation, perceived risk, and family support are frequently cited in the literature as influences on adherence behavior; however, these variables were not measured in the present study. The observation that comprehensive complication screening was uncommon (Fig. 2) is consistent with, but does not prove, an explanation based on low perceived need for monitoring among patients who have not yet experienced complications.

D. Implications for Community Nursing Practice

The findings of this study provide important implications for community nursing practice. The observation that self-management remains at a moderate level and that adherence to routine monitoring tends to be low highlights the need for more targeted and sustainable nursing interventions [29].

Community nurses play a strategic role in improving patients' self-management through health education. Educational interventions should focus on aspects that remain weak, such as structured physical activity, self-monitoring of blood glucose, and foot care practices (Fig. 1). Educational approaches should also be adapted to the predominantly older adult population (Table 1), meaning that the strategies implemented should be simple, practical, and easy to apply in daily life [30].

The finding of low adherence to routine monitoring (Table 3) also indicates the need to strengthen community-based programs such as Prolanis. Community nurses may collaborate with other healthcare professionals to increase patient participation in Prolanis through health promotion activities, appointment reminders, and the establishment of diabetes peer support groups. Strengthening Prolanis may serve as an effective strategy to improve the regularity of

blood glucose monitoring, blood pressure examinations, complication screening, and ongoing patient education (Fig. 2).

Furthermore, community nurses need to develop promotive and preventive interventions focused on lifestyle modification, such as diabetes exercise programs, nutritional counseling, smoking cessation education, and weight management interventions. This is particularly important considering that 45.7% of respondents had a history of smoking and/or obesity (Table 1), both of which may worsen diabetes outcomes.

Conclusion

This study aimed to describe the level of self-management and adherence to routine health monitoring among patients with type 2 diabetes mellitus in the service area of Primary Health Care Center X, Surakarta. Based on the findings from 324 respondents, it can be concluded that respondents were predominantly aged 56–69 years, with male respondents outnumbering female respondents (203 males and 121 females). The majority of respondents worked in the informal sector, such as traders, farmers, and private-sector workers (75%), and had been living with diabetes mellitus for approximately 5–8 years.

The findings showed that the overall level of self-management among patients with type 2 diabetes mellitus was categorized as moderate (54.3%), with medication adherence representing the strongest dimension compared with other aspects. However, the dimensions of physical activity, self-monitoring of blood glucose, and foot care remained relatively low.

In addition, adherence to routine health monitoring among patients with type 2 diabetes mellitus was still considered suboptimal, with 68.5% of respondents classified as non-adherent. Most respondents had not attended routine health check-ups consistently, and advanced examinations such as HbA1c testing and complication screening had not been conducted evenly among patients. These findings indicate that routine monitoring remains largely limited to basic blood glucose examinations and has not yet included comprehensive assessments for complication prevention.

Overall, this study concludes that self-management among patients with type 2 diabetes mellitus still needs to be improved, particularly regarding lifestyle modification and complication prevention. Furthermore, stronger efforts are needed to enhance patients' adherence to routine health monitoring at the Primary Health Care Center level.

Limitation and Suggestions

This study has several limitations that should be considered. First, the study employed a descriptive quantitative design with a cross-sectional approach; therefore, it only describes respondents' conditions at a single point in time and cannot fully establish causal relationships

between respondent characteristics and levels of self-management or adherence to routine health monitoring, despite the supplementary bivariate analysis presented in Table 5.

Second, the data were collected through self-report questionnaires, which may have introduced information bias, as respondents may not have provided answers that fully reflected their actual conditions or behaviors.

Third, this study was conducted in only one Primary Health Care Center service area, limiting the generalizability of the findings to patients with type 2 diabetes mellitus in other regions with different social characteristics and healthcare service systems. Nevertheless, this study provides important insights into the condition of self-management and adherence to routine monitoring among patients with type 2 diabetes mellitus, which may serve as a basis for strengthening diabetes care programs at the primary healthcare level.

Acknowledgment

The authors would like to express their sincere gratitude to the management and healthcare staff of Primary Health Care Center X Surakarta for their support and cooperation during the research process.

Conflict of Interest

The authors declare no conflict of interest.

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