



Knowledge, Self-Management, and Blood Glucose Control Among Patients with Type 2 Diabetes Mellitus: A Cross-Sectional Study

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by elevated blood glucose levels and associated with a high risk of complications. Effective glycemic control is influenced by patients' level of knowledge and their ability to perform self-management behaviors. This study aimed to examine the relationship between knowledge and self-management and blood glucose control among patients with Type 2 Diabetes Mellitus.

Methods: This analytical quantitative study employed a cross-sectional design with a total sampling technique. A total of 83 patients with T2DM receiving treatment at Hospital were recruited. Inclusion criteria included adult patients diagnosed with T2DM, able to communicate effectively, and willing to participate in the study. Data were collected using the Diabetes Knowledge Questionnaire (DKQ-24), the Diabetes Self-Management Questionnaire (DSMQ), and medical record data. Blood glucose control was assessed based on random blood glucose (RBG) measurements documented in patients' medical records. Data were analyzed using Spearman's rank correlation test.

Results: The majority of respondents had low levels of knowledge (50.6%) and moderate levels of self-management (72.4%). Spearman's rank correlation analysis revealed a very strong negative correlation between knowledge and blood glucose control ($r = -0.844$, $p < 0.001$) and a strong negative correlation between self-management and blood glucose control ($r = -0.675$, $p < 0.001$).

Conclusion: Better knowledge and optimal self-management were significantly associated with improved blood glucose control among patients with Type 2 Diabetes Mellitus. These findings highlight the importance of continuous diabetes education and self-management support programs to enhance glycemic control and reduce the risk of diabetes-related complications.



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INTRODUCTION

Diabetes Mellitus (DM) is one of the most prevalent non-communicable diseases (NCDs) worldwide and represents a major public health challenge. The number of individuals living with diabetes continues to increase globally. According to the International Diabetes Federation (IDF), approximately 537 million adults aged 20–79 years were living with diabetes in 2021, and this number is projected to rise to 783 million by 2045. Furthermore, diabetes and its complications are responsible for more than six million deaths annually, with one diabetes-related death occurring every five seconds worldwide ([Santoso et al., 2024](#)). Southeast Asia has the third-

highest prevalence of diabetes globally, estimated at 11.3%, while Indonesia ranks among the countries with the largest number of diabetes cases, with approximately 19.5 million affected individuals ([Kementrian Kesehatan Indonesia, 2021](#)).

Type 2 Diabetes Mellitus is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion, resulting in persistent hyperglycemia. The increasing prevalence of T2DM is associated with several factors, including aging, reduced physical activity, obesity, unhealthy dietary patterns, and metabolic changes that occur over time ([Taswin et al., 2022](#)). As the prevalence of T2DM continues to rise, effective disease management is essential to prevent acute and chronic complications and to improve patients' quality of life. Age-related metabolic changes, declining levels of physical activity, and increased insulin resistance contribute significantly to the rising incidence of Type 2 Diabetes Mellitus ([Mustafida et al., 2024](#)). As its prevalence continues to increase annually, diabetes mellitus has emerged as a major public health challenge, necessitating comprehensive prevention efforts and effective management strategies.

Previous studies have emphasized the importance of patient knowledge and self-management in achieving optimal diabetes control. Adequate knowledge enables patients to better understand their disease condition, treatment plans, nutritional requirements, physical activity recommendations, and potential complications. In addition, effective self-management involves adherence to medication, blood glucose monitoring, dietary regulation, regular exercise, and problem-solving skills related to diabetes care. [Yari et al \(2024\)](#) reported a positive association between patients' knowledge levels and their self-management abilities, indicating that individuals with greater diabetes-related knowledge tend to demonstrate better self-management practices. However, other studies have suggested that knowledge alone may not necessarily lead to improved glycemic control, emphasizing the importance of comprehensive support from healthcare professionals and family members in promoting effective diabetes management ([Nelma & Ratnalela, 2023](#); [Enarga et al., 2023](#)).

Although numerous studies have examined factors associated with glycemic control among patients with T2DM, limited evidence is available regarding the combined influence of knowledge and self-management on blood glucose control among patients receiving care in Indonesian hospital settings. Most previous studies have investigated these variables separately rather than simultaneously. Therefore, further research is needed to better understand how knowledge and self-management contribute to blood glucose control among patients with T2DM. This study aimed to analyze the relationship between knowledge and self-management and blood glucose control among patients with Type 2 Diabetes Mellitus at Hospital X, Central Jakarta. The findings are expected to provide evidence for the development of educational and self-management interventions that support optimal glycemic control and improve health outcomes among individuals with T2DM.

METHODS

Study Design and Setting

This study employed a quantitative analytic design using a cross-sectional approach to examine the relationship between knowledge, self-management, and blood glucose control among patients with Type 2 Diabetes Mellitus (T2DM). The study was conducted at the Internal Medicine Outpatient Clinic of Hospital X, Central Jakarta, Indonesia, between January and December 2024. The study setting was selected due to the increasing number of T2DM cases and the availability of patients undergoing routine diabetes management and monitoring.

Population and Sample

The study population consisted of all patients diagnosed with Type 2 Diabetes Mellitus who attended the Internal Medicine Outpatient Clinic of Hospital X during the study period. A total sampling technique was applied, resulting in 83 respondents who met the eligibility criteria.

The inclusion criteria were: (1) diagnosed with Type 2 Diabetes Mellitus for at least one year, (2) aged 18 years or older, (3) able to communicate effectively, and (4) willing to participate in the

study by providing informed consent. Patients with cognitive impairment that could interfere with questionnaire completion or those experiencing severe acute medical conditions during data collection were excluded from the study.

Variables and Instruments

The independent variables were diabetes-related knowledge and self-management. The dependent variable was blood glucose control. Knowledge was assessed using the Diabetes Knowledge Questionnaire (DKQ-24), which evaluates patients' understanding of diabetes, including disease management, diet, treatment, and complications. Self-management was measured using the Diabetes Self-Management Questionnaire (DSMQ), which assesses diabetes self-care behaviors, including glucose management, dietary control, physical activity, healthcare utilization, and medication adherence. Blood glucose control was determined based on random blood glucose (RBG) measurements obtained from patients' medical records. Higher blood glucose values indicated poorer glycemic control.

Data Collection and Analysis

Data were collected through self-administered questionnaires and review of patients' medical records. Participants completed the DKQ-24 and DSMQ questionnaires under the supervision of the researchers. Blood glucose data were subsequently obtained from the most recent random blood glucose examination documented in the medical records. Descriptive statistics were used to summarize respondents' demographic characteristics, knowledge levels, self-management practices, and blood glucose control. Frequency distributions, percentages, means, and standard deviations were calculated where appropriate. Bivariate analysis was performed using Spearman's rank correlation test to determine the relationship between knowledge and blood glucose control, as well as between self-management and blood glucose control. Statistical significance was established at $p < 0.05$ with a 95% confidence interval.

Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participation was entirely voluntary, and all respondents provided informed consent prior to enrollment. Participants were assured that all information collected would be kept confidential and used solely for research purposes. Personal identifiers were removed from the dataset to ensure anonymity and privacy throughout the study. The study protocol received ethical approval from the Health Research Ethics Committee number No.1198/KEPK-
FIK/V/2025.

RESULT

Table 1. Characteristics of Respondents (n = 83)

| Characteristics | Frequency (n) | Percentage (%) |
|------------------------|---------------|----------------|
| Age | | |
| < 20 years | 1 | 1.2 |
| 20–35 years | 13 | 15.7 |
| > 35 years | 69 | 83.1 |
| Sex | | |
| Male | 45 | 54.2 |
| Female | 38 | 45.8 |
| Education Level | | |
| Elementary School | 40 | 48.2 |
| Junior High School | 12 | 14.5 |
| Senior High School | 11 | 13.3 |
| Higher Education | 20 | 24.1 |

Most respondents were older than 35 years (83.1%), male (54.2%), and had completed elementary school education (48.2%). These findings indicate that the majority of patients with

Type 2 Diabetes Mellitus in this study were older adults with relatively low educational attainment.

Table 2. Distribution of Study Variables (n = 83)

| Characteristics | Frequency (n) | Percentage (%) |
|------------------------|---------------|----------------|
| Knowledge | | |
| Low | 42 | 50.6 |
| Adequate/High | 41 | 49.4 |
| Self-Management | | |
| Moderate | 60 | 72.4 |
| Good | 23 | 27.6 |

More than half of the respondents had low levels of diabetes-related knowledge (50.6%), while 49.4% demonstrated adequate to high knowledge. Regarding self-management, most respondents reported moderate self-management practices (72.4%), whereas 27.6% demonstrated good self-management. These findings indicate that substantial improvements in diabetes education and self-care behaviors are still needed among patients with Type 2 Diabetes Mellitus.

Table 3. Correlation Between Knowledge, Self-Management and Blood Glucose Control (n = 83)

| Variable | Correlation Coefficient (r) | p-value |
|-------------------------------------------|-----------------------------|---------|
| Knowledge and Blood Glucose Control | -0.844 | <0.001 |
| Self-Management and Blood Glucose Control | -0.675 | <0.001 |

The results of Spearman's rank correlation analysis demonstrated a statistically significant relationship between knowledge and blood glucose control ($r = -0.844$, $p < 0.001$). The negative correlation indicates that higher levels of diabetes-related knowledge were associated with better blood glucose control among patients with Type 2 Diabetes Mellitus. Similarly, a significant negative correlation was identified between self-management and blood glucose control ($r = -0.675$, $p < 0.001$). Patients with better self-management practices, including adherence to medication, dietary regulation, physical activity, and blood glucose monitoring, tended to achieve better glycemic control. Among the two independent variables, knowledge showed a stronger correlation with blood glucose control than self-management, suggesting that diabetes-related knowledge may play a fundamental role in influencing patients' glycemic outcomes.

DISCUSSION

Characteristics of Respondents

The findings showed that the majority of respondents were older than 35 years, male, and had completed elementary school education. Age is recognized as one of the major risk factors for Type 2 Diabetes Mellitus (T2DM). Age-related metabolic changes, declining physical activity, and increased insulin resistance contribute to the development and progression of T2DM. Previous studies have similarly reported that the prevalence of T2DM increases significantly among middle-aged and older adults ([Nora et al., 2025](#); [Nasution, 2021](#)). In terms of sex, male respondents slightly outnumbered female respondents. This finding is consistent with studies suggesting that men are more likely to develop T2DM due to unhealthy lifestyle behaviors, including smoking, low physical activity, and poor dietary habits ([Frimantama et al., 2024](#); [Tambunan et al., 2024](#)). However, other studies have reported a higher prevalence among women, indicating that biological and hormonal factors may also influence diabetes risk ([Aprilio et al., 2021](#); [Sari et al., 2025](#)).

Nearly half of the respondents had only completed elementary school education ([Adelina et al., 2023](#); [Listiani & Ayubi, 2024](#)). Educational attainment plays an important role in shaping health literacy and the ability to understand disease management information. Individuals with lower educational levels may experience difficulties in understanding medical instructions and implementing recommended self-care practices, which can negatively affect diabetes management outcomes ([Dharmayanti et al., 2024](#); [Sahadewa et al., 2024](#)).

Knowledge Among Patients with Type 2 Diabetes Mellitus

This study found that more than half of the respondents had low levels of diabetes-related knowledge. This finding indicates that many patients still have limited understanding regarding the causes, symptoms, treatment, dietary management, and complications of diabetes mellitus. Inadequate knowledge may hinder patients' ability to make informed decisions regarding disease management and healthy lifestyle behaviors. Several studies have reported similar findings, demonstrating that low educational attainment, advanced age, and limited access to health information contribute to poor diabetes-related knowledge ([Agustria et al., 2021](#); [Damayanti et al., 2023](#)). Conversely, studies conducted among younger and better-educated populations have shown higher levels of diabetes knowledge due to greater access to health information and educational resources ([Rustiana et al., 2024](#); [Febriyanti et al., 2025](#)). Adequate knowledge is considered the foundation of successful diabetes management because it influences patients' awareness of treatment goals, medication adherence, dietary regulation, and complication prevention. Therefore, continuous diabetes education programs should be strengthened to improve patients' understanding and promote healthier behaviors ([Rosalinda dan Nugraheni, 2023](#); [Vitniawati et al., 2024](#)).

Self-Management Among Patients with Type 2 Diabetes Mellitus

The majority of respondents demonstrated moderate levels of self-management. This finding suggests that although patients were generally aware of recommended diabetes self-care practices, many had not fully implemented these behaviors consistently in their daily lives. Effective self-management encompasses medication adherence, dietary control, regular physical activity, blood glucose monitoring, and healthcare utilization. Previous studies have reported that barriers to optimal self-management include lack of motivation, insufficient family support, financial constraints, and limited access to healthcare services ([Drissianti et al., 2025](#); [Hidayanti et al., 2023](#)). The moderate level of self-management observed in this study indicates that patients may require ongoing support from healthcare professionals and family members. Educational interventions alone may be insufficient unless accompanied by behavioral reinforcement, counseling, and regular follow-up to encourage sustainable lifestyle modifications ([Yusnita & Tuharea, 2021](#); [Susilawati et al., 2023](#)).

Relationship Between Knowledge, Self-Management, and Blood Glucose Control

The results demonstrated a significant negative correlation between knowledge and blood glucose control. Patients with higher levels of diabetes-related knowledge tended to have lower blood glucose levels and better glycemic control. This finding suggests that knowledge plays a critical role in enabling patients to understand treatment recommendations and adopt appropriate self-care behaviors. A significant negative correlation was also found between self-management and blood glucose control. Patients who reported better self-management practices were more likely to achieve favorable glycemic outcomes. Effective self-management behaviors, including medication adherence, healthy dietary practices, regular physical activity, and routine blood glucose monitoring, contribute directly to improved glucose regulation.

The correlation coefficient indicated that knowledge had a stronger association with blood glucose control than self-management. This finding suggests that knowledge may serve as a fundamental prerequisite for effective self-management. Patients who understand their condition are more likely to engage in appropriate health behaviors and adhere to treatment recommendations. These findings are consistent with previous studies demonstrating that adequate knowledge and effective self-management are essential determinants of glycemic

control among individuals with T2DM ([Idris & Sari, 2022](#); [Angelina et al., 2025](#)). However, knowledge alone may not guarantee optimal glucose control. Other factors, including family support, psychological well-being, socioeconomic status, duration of illness, dietary habits, physical activity, and medication adherence, may also influence glycemic outcomes ([Munir & Asnaniar., 2020](#); [Rahmawati et al., 2021](#)). Therefore, comprehensive diabetes management programs should integrate patient education, behavioral counseling, family involvement, and continuous monitoring to achieve sustainable improvements in blood glucose control and reduce the risk of diabetes-related complications.

CONCLUSION

This study demonstrated that knowledge and self-management were significantly associated with blood glucose control among patients with Type 2 Diabetes Mellitus. A very strong negative correlation was found between diabetes-related knowledge and blood glucose control, while self-management showed a strong negative correlation with blood glucose control. These findings indicate that patients with higher levels of knowledge and better self-management practices tend to achieve better glycemic control. The results highlight the importance of strengthening diabetes education and promoting effective self-management behaviors, including medication adherence, dietary regulation, regular physical activity, and routine blood glucose monitoring. Healthcare professionals should implement continuous educational interventions and provide ongoing support to enhance patients' ability to manage their condition effectively.

Future studies are recommended to explore additional factors influencing glycemic control, such as dietary patterns, physical activity levels, medication adherence, duration of diabetes, psychological factors, and family support. Longitudinal or interventional studies are also needed to evaluate the long-term effectiveness of educational and self-management programs in improving glycemic outcomes among patients with Type 2 Diabetes Mellitus.

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Conflict of Interest : The authors declare that there are no conflicts of interest related to this study.

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