THE RELATIONSHIP BETWEEN THE LEVEL OF KNOWLEDGE AND PATIENT COMPLIANCE IN CONSUMING DIABETES MELLITUS MEDICATION IN THE INPATIENT UNIT TOTO KABILA HOSPITAL

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ABSTRACT

This study aimed to determine the relationship between knowledge levels and medication adherence among patients with diabetes mellitus in the inpatient unit of Toto Kabila Hospital, Gorontalo. A quantitative analytical observational study with a cross-sectional design was conducted involving 58 patients in July–August 2025. Knowledge was assessed using the 24-item Diabetes Knowledge Questionnaire (DKQ), while medication adherence was measured using the eight-item Morisky Medication Adherence Scale (MMAS-8). Data were analyzed using the chi-square test. The results showed that most respondents had a moderate level of knowledge (63.8%), followed by good knowledge (22.4%) and low knowledge (13.8%). Regarding medication adherence, 44.8% of respondents had moderate adherence, 37.9% had low adherence, and 17.2% had high adherence. The chi-square analysis revealed a statistically significant relationship between knowledge level and medication adherence ((\chi^2=16.005), (df=4), (p=0.003)). These findings indicate that knowledge level was significantly associated with medication adherence among patients with diabetes mellitus at Toto Kabila Hospital. However, because of the cross-sectional design, the findings do not establish a causal relationship. The results highlight the importance of patient education and medication counseling as components of diabetes management.

Keywords: *diabetes mellitus, knowledge level, medication adherence, inpatients, cross-sectional study*

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by elevated blood glucose levels resulting from impaired insulin secretion, insulin action, or both. The increasing burden of diabetes has become a major public health concern worldwide, particularly in Asian countries, where changes in lifestyle, population aging, and other risk factors contribute to the growing number of affected individuals. Effective diabetes management requires continuous treatment, regular monitoring of blood glucose levels, appropriate dietary practices, and adherence to prescribed medications. However, achieving optimal glycemic control remains challenging when patients have insufficient knowledge about their disease and do not consistently follow their treatment regimens. Patient characteristics and their understanding of diabetes treatment are important considerations in developing effective strategies to improve medication adherence [1][2].

In Indonesia, diabetes mellitus represents an important healthcare challenge because inadequate disease management can increase the risk of complications and hospitalization.

Submit: Nov 17th, 2025 Accepted: June 22th, 2026 Published: Sept 30th, 2026

Medication adherence is essential for maintaining glycemic control and preventing the progression of diabetes-related complications. Nevertheless, patients may experience difficulties following prescribed treatment because of limited disease knowledge, medication-related concerns, socioeconomic circumstances, and inadequate support. Handayani et al. [3], examined determinants of blood glucose levels through medication adherence and highlighted the importance of adherence in diabetes management. Similarly, Alfian et al. [4], investigated barriers to medication adherence among patients with type 2 diabetes mellitus, emphasizing the need to identify factors that interfere with consistent medication use. These findings indicate that improving diabetes management requires attention not only to treatment availability but also to patients' understanding of their condition and their ability to follow prescribed medication schedules.

Patient knowledge is an important component of diabetes self-management because it helps individuals understand the purpose of treatment, the importance of taking medication according to medical instructions, and the potential consequences of discontinuing or incorrectly using prescribed drugs. Patients with adequate knowledge may be better equipped to recognize the benefits of medication, manage treatment-related challenges, and make informed decisions regarding their health. AlShayban et al. [2], examined the association between disease knowledge and medication adherence among outpatients with type 2 diabetes mellitus in Saudi Arabia. Their study provides relevant evidence for understanding the relationship between patients' knowledge and their adherence to prescribed treatment. Furthermore, Pan et al. [5], investigated the determinants of medication adherence and diabetes knowledge among patients with type 2 diabetes mellitus in Northwestern China, highlighting the relevance of examining these two variables together. However, knowledge alone may not guarantee adherence because patients' behavior can also be influenced by personal beliefs, psychological conditions, and social circumstances.

Several factors may influence medication adherence among patients with diabetes mellitus. These include age, educational attainment, socioeconomic status, self-efficacy, perceptions of illness, medication beliefs, and family support. Kang and Hur [6], examined medication adherence and its associated factors among individuals with type 2 diabetes mellitus in Laos, while Alsaidan et al. [7], investigated adherence-related factors among patients attending primary healthcare centers in the Eastern Province of Saudi Arabia. Hadush et al. [8], also explored patients' perceptions and knowledge of diabetes and medications in relation to medication adherence and glycemic control in Northern Ethiopia. Collectively, these studies demonstrate that medication adherence is a multifaceted issue that should be considered within the broader context of patients' knowledge, perceptions, and individual circumstances. Therefore, examining the relationship between knowledge and medication adherence is important for identifying opportunities to strengthen patient education and improve treatment practices.

Although previous studies have investigated diabetes knowledge and medication adherence in various countries and healthcare settings, further investigation is warranted in specific hospital populations in Indonesia. Much of the available evidence concerns outpatient

services or healthcare settings outside Indonesia, which may differ from inpatient care in terms of disease severity, treatment supervision, and patient needs. Hospitalized patients may require additional understanding of medication schedules, treatment objectives, potential adverse effects, and the importance of continuing therapy after discharge. Research conducted in a specific institutional setting is therefore necessary to establish whether patients' knowledge is associated with their compliance with prescribed diabetes medication. Such evidence may help healthcare professionals identify educational needs and develop more appropriate interventions for patients receiving inpatient care.

Toto Kabila Hospital provides a relevant setting for examining this issue among patients with diabetes mellitus receiving inpatient treatment. Understanding the relationship between patients' knowledge and medication compliance may provide useful information for strengthening patient education, improving communication between healthcare professionals and patients, and supporting continuity of treatment. Accordingly, this study aims to determine the relationship between the level of knowledge and patient compliance in consuming diabetes mellitus medication in the inpatient unit of Toto Kabila Hospital. The findings are expected to contribute to the development of evidence-based educational strategies that support medication compliance and improve diabetes management in the hospital setting.

Literature Review

Diabetes Mellitus and Its Management

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels that requires continuous treatment and long-term management to prevent complications. Effective diabetes management involves pharmacological treatment, lifestyle modification, regular monitoring, and patient participation in healthcare decisions. Medication adherence is particularly important because inconsistent use of prescribed antidiabetic medications may compromise glycemic control and increase the risk of diabetes-related complications. Jackson et al. [9], examined medication adherence among patients with type 2 diabetes in Nigeria, while Aflakpui et al. [10], investigated the prevalence and factors associated with low medication adherence among patients attending a diabetic clinic in Ghana. These studies highlight the importance of medication-taking behavior in diabetes management. Furthermore, Ansari [11], explored adherence to diabetes treatment regimens in Saudi Arabia, reinforcing the relevance of evaluating treatment adherence across different healthcare settings.

Patient Knowledge and Medication Compliance

Patient knowledge refers to an individual's understanding of diabetes mellitus, its complications, treatment objectives, medication schedules, and the importance of following prescribed therapy. Adequate knowledge may help patients recognize the benefits of medication, understand the consequences of missed doses, and make informed decisions about their treatment. AlShayban et al. [2], investigated the association between disease knowledge and medication adherence among outpatients with type 2 diabetes mellitus in Saudi Arabia. Similarly, Alayed et al. [12], examined the relationship between diabetes knowledge and medication adherence among patients in Saudi Arabia. These studies provide a

basis for considering knowledge as a potentially important factor associated with medication compliance. However, knowledge does not necessarily guarantee adherence, because patients may understand treatment recommendations but experience practical, psychological, or socioeconomic barriers that prevent them from following their prescribed regimens consistently.

Factors Influencing Medication Compliance

Medication compliance among patients with diabetes mellitus may be influenced by sociodemographic characteristics, disease-related conditions, psychological factors, treatment complexity, and the quality of interactions with healthcare professionals. Age, educational attainment, and socioeconomic circumstances may affect patients' ability to understand medical information and maintain regular medication use. Schoenthaler et al. [13], examined patient and physician factors associated with adherence to diabetes medications, emphasizing the relevance of considering both individual and healthcare-related influences. P et al. [14], investigated factors influencing adherence to oral hypoglycemic agents among patients with type 2 diabetes mellitus, while Chen et al. [15], examined adherence-related factors among patients with hypertension and concomitant diabetes mellitus. In addition, Gow et al. [16], reviewed factors influencing medication adherence among adults living with diabetes and comorbidities. Collectively, these studies support a multifactorial understanding of medication compliance, indicating that patient knowledge should be examined alongside other potential influences rather than treated as the sole determinant of adherence.

Relationship Between Patient Knowledge and Medication Compliance

The relationship between patient knowledge and medication compliance is an important consideration in diabetes management because understanding the disease and its treatment may encourage patients to follow medical recommendations consistently. Patients who understand the purpose of antidiabetic medication, the importance of regular dosing, and the potential consequences of treatment interruption may be more likely to maintain their prescribed medication routines. AlShayban et al. [2], investigated this relationship among patients with type 2 diabetes mellitus in Saudi Arabia, while Alayed et al. [12], further examined the association between diabetes knowledge and medication adherence. In addition, Farahani Dastjani et al. [17], evaluated the effects of education based on the Health Belief Model on medication adherence among patients with diabetes, providing a theoretical basis for examining how health education may influence treatment-related behavior. Nevertheless, the strength and direction of the association may vary across populations and healthcare settings. Therefore, an empirical assessment is necessary to determine whether differences in knowledge levels are significantly associated with medication compliance among patients receiving inpatient care.

Research Gap and Conceptual Relevance

Previous studies have examined medication adherence, its influencing factors, and the relationship between diabetes knowledge and treatment behavior in various countries and healthcare settings [10][2][16]. However, findings from outpatient clinics and international populations cannot automatically be generalized to hospitalized patients in

Indonesia, whose treatment circumstances and educational needs may differ. The inpatient setting provides an important context for examining whether patients' knowledge is associated with compliance with prescribed diabetes medication. In particular, evidence specific to the inpatient unit of Toto Kabila Hospital is needed to understand this relationship within the local healthcare context. Accordingly, the present study investigates the relationship between the level of knowledge and patient compliance in consuming diabetes mellitus medication in the inpatient unit of Toto Kabila Hospital. The study is expected to provide locally relevant evidence that may inform patient education and medication management practices. As the proposed research examines an association, its findings may establish whether knowledge and compliance are related but would not, by themselves, demonstrate that knowledge directly causes improved compliance.

RESEARCH METHODS

Research Design

This study employed a quantitative approach using an observational analytical method with a cross-sectional design. The quantitative approach was selected to examine the relationship between patients' knowledge of diabetes mellitus and their compliance with prescribed antidiabetic medication using numerical data and statistical analysis. The cross-sectional design involved measuring the independent and dependent variables at a single point in time without manipulating the study variables. The independent variable was the level of knowledge about diabetes mellitus, while the dependent variable was medication compliance among patients with diabetes mellitus.

Research Location and Period

This study was conducted in the inpatient unit of Toto Kabila Hospital, Gorontalo, Indonesia, from July to August 2025. The hospital was selected as the research setting to examine the relationship between diabetes-related knowledge and medication compliance among hospitalized patients receiving treatment for diabetes mellitus. Data collection was conducted during the specified research period using structured questionnaires administered to eligible respondents.

Research Variables and Operational Definitions

The study examined two principal variables: patients' knowledge of diabetes mellitus and their compliance with prescribed antidiabetic medication. Knowledge was operationally defined as the respondents' understanding of diabetes mellitus, including general information about the disease, its complications, hyperglycemia and hypoglycemia, and the types and causes of the disease. Knowledge was measured using the 24-item Diabetes Knowledge Questionnaire (DKQ), with correct answers scored as 1 and incorrect or "do not know" answers scored as 0. The resulting scores were categorized according to the established scoring criteria of the instrument. Medication compliance was operationally defined as the extent to which patients followed their prescribed antidiabetic medication regimen, measured using the eight-item Morisky Medication Adherence Scale (MMAS-8). Compliance was classified as low for scores below 6, moderate for scores of 6–7, and high for a score of 8. The relationship between the two variables was assessed statistically using the questionnaire results.

Research Instruments

Data were collected using structured questionnaires consisting of the Diabetes Knowledge Questionnaire (DKQ)

and the eight-item Morisky Medication Adherence Scale (MMAS-8). The DKQ comprised 24 items covering four domains: general knowledge about diabetes mellitus (12 items), complications of diabetes mellitus (4 items), hyperglycemia and hypoglycemia (4 items), and types and causes of the disease (4 items). Each correct response received a score of 1, whereas incorrect and "do not know" responses received a score of 0. The MMAS-8 consisted of eight items designed to assess patients' medication-taking behavior. The first seven items used dichotomous responses, while the eighth item employed a five-point response scale. The total MMAS-8 score was used to classify respondents into low, moderate, and high medication compliance categories. The instruments were selected to obtain structured measurements of the study variables.

Measurement and Scoring Procedures

The knowledge questionnaire was scored using a dichotomous system, with a maximum possible score of 24. Correct responses were assigned 1 point, while incorrect or unknown responses were assigned 0 points. The medication compliance questionnaire was scored according to the MMAS-8 scoring procedure, with the first seven items evaluated using the specified yes/no scoring rules and the eighth item scored using its graded response options. The resulting adherence score was interpreted as low compliance for scores below 6, moderate compliance for scores from 6 to 7, and high compliance for a score of 8. The scoring procedures were used to classify respondents consistently before conducting the statistical analysis.

Data Analysis

Data analysis consisted of descriptive and inferential statistical procedures. Descriptive analysis was used to summarize respondents' characteristics and the distribution of knowledge and medication compliance categories using frequencies and percentages. Inferential analysis was conducted to examine the relationship between the level of knowledge and medication compliance among patients with diabetes mellitus. The chi-square test was considered appropriate for assessing the association between the two categorical variables, provided that its assumptions regarding expected cell frequencies were satisfied. If these assumptions were not met, an appropriate alternative, such as Fisher's exact test, would be considered. Statistical significance was evaluated at a threshold of $p < .05$.

RESEARCH RESULT

A total of 58 patients with diabetes mellitus participated in this study. Respondent characteristics included age, gender, educational attainment, duration of diabetes mellitus, and the number of antidiabetic medications consumed. The distribution of these characteristics is presented in Table 1.

Table 1. Respondent Characteristics (n = 58)

Characteristics	Category	n	%
Age	30–39 years	10	17.2
	40–49 years	16	27.6
	50–59 years	25	43.1
	≥60 years	7	12.1
Gender	Male	21	36.2
	Female	37	63.8
Education	Elementary school	29	50
	Junior high school	5	8.6
	Senior high school	17	29.3
	Bachelor's degree or equivalent	7	12.1
Duration of diabetes	1–5 years	38	65.5

	6–10 years	19	32.8
	≥11 years	1	1.7
Number of medications	1 medication	17	29.3
	2 medications	40	69
	3 medications	1	1.7

Source: Primary data, 2025.

As shown in Table 1, the largest age group was 50–59 years (43.1%), and most respondents were female (63.8%). Half of the respondents had completed elementary school (50.0%). Most had been living with diabetes mellitus for 1–5 years (65.5%), while 69.0% reported taking two antidiabetic medications. These characteristics provide a demographic and clinical overview of the respondents included in the analysis.

The distribution of respondents according to their knowledge of diabetes mellitus is presented in Table 2.

Table 2. Knowledge Levels of Patients With Diabetes Mellitus

Knowledge level	Score range	n	%
Good	76–100%	13	22.4
Moderate	56–75%	37	63.8
Low	≤55%	8	13.8
Total		58	100

Source: Primary data, 2025.

Table 2 shows that most respondents had a moderate level of knowledge about diabetes mellitus (63.8%). A good level of knowledge was identified in 22.4% of respondents, whereas 13.8% demonstrated a low level of knowledge. The moderate category was therefore the most prevalent among patients hospitalized in the inpatient unit of Toto Kabila Hospital.

Medication compliance among the respondents was assessed using the MMAS-8 instrument. The distribution of compliance categories is presented in Table 3.

Table 3. Medication Compliance Levels Among Patients With Diabetes Mellitus

Compliance level	MMAS-8 score	n	%
High	8	10	17.2
Moderate	6–7	26	44.8
Low	Below 6	22	37.9
Total		58	100

Source: Primary data, 2025.

As presented in Table 3, moderate medication compliance was the most frequently observed category (44.8%), followed by low compliance (37.9%) and high compliance (17.2%). The findings indicate that fewer than one-fifth of respondents achieved the highest compliance category. The proportion classified as having low compliance also represents a substantial share of the study population.

The association between knowledge level and medication compliance was examined using the chi-square test. The reported statistical results are presented in Table 4.

Table 4. Association Between Knowledge Level and Medication Compliance

Statistical test	Value
Pearson Chi-Square (X^2)	16.005
Degrees of Freedom (df)	4
Number of Respondents (N)	58
p value	0.003
Significance Level (\(\alpha\))	0.05
Conclusion	Statistically significant association

Source: Primary data, 2025.

The chi-square test indicated a statistically significant association between patients' knowledge levels and medication compliance (X^2= 16.005, df = 4, N = 58, p = .003). Since the p value was below .05, the null hypothesis was rejected.

DISCUSSION

The findings of this study indicate that patients with diabetes mellitus hospitalized at Toto Kabila Hospital

predominantly had a moderate level of knowledge and moderate medication compliance. The statistically significant association between knowledge level and medication compliance ((\chi^2 = 16.005), (df = 4), (p = .003)) suggests that these variables were not independent in the study population. This finding supports the importance of examining patients' understanding of diabetes and its treatment as part of efforts to improve medication-taking behavior. Nevertheless, because the study employed a cross-sectional design, the results establish an association rather than a causal relationship. Furthermore, the absence of a cross-tabulation showing the distribution of compliance across knowledge categories limits the interpretation of the direction and specific pattern of this association.

The predominance of respondents with moderate knowledge (63.8%) suggests that many patients possessed some understanding of diabetes mellitus but may not have achieved a comprehensive understanding of the disease and its management. Half of the respondents had completed elementary school, which may be relevant when considering their access to and understanding of health information. However, educational attainment alone cannot determine an individual's knowledge, as comprehension may also depend on the quality of health education, previous treatment experiences, and communication with healthcare professionals. AlShayban et al. [2] examined the association between disease knowledge and medication adherence among patients with type 2 diabetes mellitus in Saudi Arabia, while Pan et al. [5] investigated knowledge and adherence determinants among patients in Northwestern China. These studies provide relevant comparative contexts for examining knowledge as a factor associated with diabetes management. In the present study, the proportion of respondents with low knowledge (13.8%) also indicates a need to identify specific areas of misunderstanding and tailor educational communication to patients' needs.

Medication compliance presented a further concern, as 37.9% of respondents were classified as having low compliance and only 17.2% achieved high compliance. Although moderate compliance was the most frequent category (44.8%), the distribution indicates that consistent adherence was not achieved by all patients. This finding is important because diabetes management requires patients to follow prescribed treatment regimens as directed by healthcare professionals. Jackson et al. [9] examined medication adherence among patients with type 2 diabetes in Nigeria, while Aflakpui et al. [10] investigated the prevalence and factors associated with low adherence among diabetic clinic patients in Ghana. Their research contexts underscore the relevance of investigating medication-taking behavior across different populations. However, the present study's compliance distribution alone cannot establish why patients did not adhere to treatment. Potential explanations, including forgetfulness, medication beliefs, treatment complexity, or difficulties understanding instructions, require direct assessment rather than being inferred from the observed percentages.

The demographic and clinical characteristics of the respondents provide additional context for interpreting the findings. Most participants were aged 50–59 years (43.1%), female (63.8%), and had lived with diabetes for 1–5 years (65.5%). In addition, 69.0% reported taking two antidiabetic medications. These characteristics may be relevant to

understanding patients' treatment experiences, but the study did not report separate statistical analyses linking age, gender, disease duration, education, or medication number with knowledge or compliance. Consequently, it cannot be concluded that any of these characteristics contributed to the observed association. Schoenthaler et al. [13] examined patient and physician factors associated with adherence to diabetes medication, while Gow et al. [16] reviewed factors influencing adherence among adults living with diabetes and comorbidities. These studies support a broader understanding of adherence as a phenomenon potentially shaped by individual, treatment-related, and healthcare-related factors. Future analyses at Toto Kabila Hospital could examine these characteristics as additional variables to clarify which factors are most strongly associated with medication compliance.

The significant association identified in this study is consistent with the research focus of AlShayban et al. [2] and Alayed et al. [12], who investigated the relationship between diabetes knowledge and medication adherence in Saudi Arabia. The findings also align conceptually with the work of Farahani Dastjani et al. [17], which evaluated an educational intervention based on the Health Belief Model to improve medication adherence among patients with diabetes. Together, these studies provide a rationale for considering patient education as one component of adherence-support strategies. However, the present findings do not demonstrate that increasing knowledge will necessarily improve compliance, nor do they establish the magnitude or direction of the relationship. Direct comparison of effect sizes is also not possible without the original contingency table and corresponding statistical measures. The contribution of the present study lies in providing evidence of an association in the specific inpatient context of Toto Kabila Hospital, while highlighting the need for more detailed local investigation.

From a practical perspective, the findings suggest that healthcare professionals should assess patients' understanding of diabetes and medication instructions as part of routine inpatient care. Educational communication could address the purpose of prescribed medications, dosing schedules, potential adverse effects, and the importance of continuing treatment according to medical advice after discharge. Given the educational profile of the respondents, clear explanations, simple written instructions, and confirmation of understanding may be useful approaches to consider. Healthcare professionals may also explore individual barriers to adherence and involve family members in discharge education when appropriate and with the patient's agreement. These strategies are practical implications rather than interventions tested by this study; their effectiveness would require further evaluation. Follow-up research could assess whether structured education and post-discharge support improve medication adherence and clinical outcomes.

Several limitations should be considered when interpreting these findings. First, the study included 58 respondents from a single hospital, which limits the generalizability of the results to other patient populations and healthcare settings. Second, the cross-sectional design does not establish temporal sequence or causality between knowledge and compliance. Third, both variables were measured using questionnaires, and medication compliance assessed through self-report may be affected by recall or

social desirability bias. Finally, the reported chi-square result does not show the distribution of compliance within each knowledge category, and information about expected cell frequencies was not provided. The full contingency table, confirmation of the statistical output, and an appropriate measure of association would strengthen the interpretation of the findings. Despite these limitations, the study provides locally relevant evidence that knowledge level and medication compliance were significantly associated among patients with diabetes mellitus in the inpatient unit of Toto Kabila Hospital. Further research involving larger samples, multiple healthcare facilities, and longitudinal or intervention-based designs is warranted to clarify this relationship and evaluate strategies for improving adherence.

CONCLUSION

This study concludes that knowledge level is significantly associated with medication adherence among patients with diabetes mellitus in the inpatient unit of Toto Kabila Hospital, Gorontalo. The findings indicate that patients' understanding of diabetes and its treatment is an important aspect to consider in supporting medication adherence. Therefore, healthcare professionals should strengthen patient education and medication counseling to improve patients' understanding of their treatment regimens and encourage consistent medication use. Further studies are needed to explore other factors influencing medication adherence and clarify the relationship between patients' knowledge and their medication-taking behavior.

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