

Analysis of Knowledge Level, Self-Efficacy, and Self-Management among Type 2 Diabetes Mellitus Patients in Rural Areas of Aceh Province

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Abstract

Introduction: Diabetes mellitus (DM) is a chronic disease and a major global health challenge. Uncontrolled hyperglycemia can cause microvascular and macrovascular complications. Patients' knowledge, self-efficacy, and self-management abilities, which vary in rural communities, influence effective management. **Objective:** This study aimed to analyze knowledge, self-efficacy, and self-management among patients with type 2 DM in rural areas of Aceh Province. **Method:** A cross-sectional design was used involving 72 respondents. Data were collected using structured questionnaires: DKQ-24 for knowledge, DES-SF for self-efficacy, and the Diabetes Mellitus Self-Management Behavior questionnaire for self-management. **Result and Discussion:** Descriptive and crosstab analyses were conducted. The mean score of knowledge was 13.60 (SD=2.516), self-efficacy 25.63 (SD=3.510), and self-management 73.54 (SD=10.911). The findings indicate that knowledge, self-efficacy, and self-management levels among patients with type 2 DM in rural Aceh remain varied and suboptimal. **Conclusion:** These findings highlight the importance of strengthening education and patient empowerment strategies tailored to rural settings. Improving access to continuous support from healthcare providers and communities may enhance treatment adherence, promote healthier behaviors, and reduce long-term disease burden locally.

Introduction

Diabetes mellitus (DM) is a chronic non-communicable disease that has become a major global health challenge. Long-term uncontrolled hyperglycemia can lead to various microvascular and macrovascular complications such as nephropathy, neuropathy, retinopathy, coronary heart disease, and stroke. According to the World Health Organization (2024), the global prevalence of diabetes has increased significantly over the last three decades, from approximately 200 million cases in 1990 to 830 million cases in 2022. This increase has contributed to rising morbidity, mortality, and healthcare costs due to diabetes complications.

Indonesia is among the top five countries with the highest number of diabetes cases in the world. Data from the International Diabetes Federation (2021) reported that there were 19.5 million people living with diabetes in Indonesia, and this number is projected to continue increasing until 2045. Aceh Province ranks among the top ten provinces in Indonesia for the highest proportion of type 2 diabetes. The Aceh Health Profile (2023) recorded 189,464 diabetes patients in 2022. This condition indicates that type 2 diabetes mellitus (T2DM) is a significant health problem, including in rural areas that have limited access to healthcare services and continuous education.

The control of type 2 DM depends not only on pharmacological therapy but also on the patient's ability to perform self-management. Diabetes self-management includes dietary regulation, physical activity, medication adherence, blood glucose monitoring, and foot care. The patient's level of knowledge and self-efficacy strongly influences the success of this management. Adequate knowledge enables patients to understand the course of the disease, the risk of complications, and the importance of blood glucose control. Previous studies have shown that low knowledge is associated with poor glycemic control and an increased risk of complications (Pakpour et al., 2024).

Self-efficacy is a behavior-specific cognitive factor that plays an important role in implementing health-promoting behaviors. High self-efficacy reduces perceived barriers and increases the likelihood of engaging in health-promoting behaviors (Zheng et al., 2020). However, previous international and national studies have shown that diabetes patients generally have low to moderate levels of self-efficacy, indicating that patients lack confidence in managing their diabetes (Irawan et al., 2022; Ong-Artborirak et al., 2023; Rambe et al., 2024; Zheng et al., 2020).

Rural areas face more complex challenges in diabetes management. Limited access to healthcare facilities, low health literacy, sociodemographic factors, and economic conditions can influence patients' knowledge, self-efficacy, and self-management levels (Akbar et al., 2025; Dugani et al., 2020; Fierda et al., 2021). Knowledge and self-efficacy are the most dominant factors influencing self-management among diabetes patients in rural areas (Akbar et al., 2025). However, analytical studies specifically describing and analyzing the levels of knowledge, self-efficacy, and self-management among type 2 DM patients in rural areas of Aceh Province are still limited. Understanding these three aspects is important as a basis for planning community nursing interventions and strengthening community-based promotive programs.

Based on this background, this study aimed to analyze the levels of knowledge, self-efficacy, and self-management among type 2 DM patients in rural areas of Aceh Province. The findings are expected to provide an empirical overview of diabetes self-management conditions in rural communities and serve as a basis for developing more contextual and needs-based intervention strategies.

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Method

This was survey research using a cross-sectional study design conducted in community health centers within the working area of Bireuen Regency, Aceh Province. Data were collected in December 2025. The Health Office and community health centers in the Bireuen Regency area provided full support and assistance during the implementation of this study. Sampling in this study was conducted using probability sampling with a cluster random sampling technique. Out of a total of 20 community health centers in Bireuen Regency, six were randomly selected. Samples were selected using simple random sampling based on attendance lists from Prolanis activities in the selected health centers. The inclusion criteria were (a) registered as Prolanis participants at community health centers in Bireuen Regency aged 18–59 years and (b) able to read and write. The exclusion criteria included patients with severe complications (advanced kidney failure and severe stroke) based on health center medical records.

The sample size was calculated based on a power analysis of 0.80 and an effect size of 0.50 with an alpha value of 0.05, resulting in a minimum sample of 64 participants (Cohen, 1988; Munro, 2001). To anticipate respondent withdrawal, the researchers increased the sample size by 10%, resulting in 70.4 Prolanis participants. Therefore, the sample size in this study was rounded up to 72 respondents. The questionnaire used to measure diabetes patients' knowledge was the Diabetes Knowledge Questionnaire (DKQ-24), which consists of 24 statement items with true and false answer options. Correct answers were scored 1, while incorrect answers were scored 0. The DKQ-24 questionnaire consists of 13 negative statements, namely items numbers 1, 3, 4, 7, 9, 10, 12, 13, 17, 21, 22, 23, and 24, and 11 positive statements, namely items numbers 2, 5, 6, 8, 11, 14, 15, 16, 18, 19, and 20. The Indonesian version of the DKQ-24 questionnaire has undergone validity and reliability testing with a Cronbach's alpha value of 0.603 and a CVI value of 0.81 (Agrimon, 2014 in Ulva, 2023).

Diabetes patients' self-efficacy was measured using the Diabetes Empowerment Scale Short Form (DES-SF), which consists of 8 question items using a Likert scale and has undergone validity and reliability testing in the Indonesian version with a Cronbach's alpha value of > 0.70 . The CVI results obtained from eight experts (1 endocrinologist, 1 internal medicine specialist, 2 general practitioner diabetes counselors, 2 diabetes nurses, 1 health promotion practitioner, and 1 public health practitioner) showed a CVI value of 0.88. All questions were positive statements, and the scoring used a Likert scale. The response options were strongly disagree (SD) = 1, disagree (D) = 2, neutral (N) = 3, agree (A) = 4, and strongly agree (SA) = 5 (Agrimon, 2014 in Ulva, 2023). The knowledge and self-efficacy questionnaires used in this study had previously been applied in research conducted at the endocrinology outpatient clinic of Dr. Zainoel Abidin Regional General Hospital, Banda Aceh, where content validity, consisting of face validity and logical validity, had already been performed with an S-CVI value of 1. Therefore, instruments B and C in this study did not undergo face validity testing again.

Diabetes patients' self-management was measured using the Diabetes Mellitus Self-Management Behavior questionnaire, which consists of 29 Likert-scale question items, including 20 positive statements, namely items 1, 3, 5, 8, 9, 11, 12, 13, 14, 16, 17, 18, 19, 21, 23, 24, 26, 27, 28, and 29; and 9 negative statements, namely items 2, 4, 6, 7, 10, 15, 20, 22, and 25. This questionnaire had undergone validity testing using product moment correlation with item correlation results ranging from 0.385 to 0.797 and reliability testing with a Cronbach's alpha value of 0.930 (Putri et al., 2013). The self-management questionnaire used in this study had previously been used in Indonesia and had undergone

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validity and reliability testing. Therefore, the researchers conducted a face validity test among Prolanis participants at the Darussalam Community Health Center in Aceh Besar Regency.

Result and Discussion

1. Result

A total of 72 respondents participated in this study. Based on demographic characteristics, most respondents were in the 46–55-year age group (48.6%). The majority of respondents were female (94.4%) and married (70.8%). Respondents’ educational background was dominated by elementary school graduates or equivalents (33.3%), followed by senior high school graduates (25%). In terms of occupation, most respondents were housewives (62.5%). Most respondents had suffered from diabetes mellitus for more than 5 years (61.1%) and had participated in the Prolanis program for more than 2 years (79.2%). Table 1 provides additional details.

Table 1
 Frequency Distribution of Respondents’ Characteristics (n = 72)

Characteristics	n	%
Age		
26–35 years	2	2.8
36–45 years	11	15.3
46–55 years	35	48.6
55–59 years	24	33.3
Gender		
Male	4	5.6
Female	68	94.4
Marital Status		
Married	51	70.8
Widow	18	25.0
Widower	3	4.2
Educational Level		
No formal education	2	2.8
Elementary School/Equivalent	24	33.3
Junior High School/Equivalent	16	22.2
Senior High School/Equivalent	18	25.0
Academy/University	12	16.7
Occupation		
Civil Servant	12	16.7
Retired	1	1.4
Housewife	45	62.5
Farmer	12	16.7
Unemployed	2	2.8
Duration of DM		
DM <1 year	3	4.2
DM >1–<5 years	25	34.7
DM > 5 years	44	61.1
Duration of Participation in Prolanis		
Prolanis <1 year	6	8.3
Prolanis >1–<2 years	9	12.5
Prolanis >2 years	57	79.2

The analysis showed that the average knowledge score was 13.60 (SD = 2.516), indicating that respondents’ knowledge levels were in the moderate category with relatively homogeneous data variation. The average self-efficacy score was 25.63 (SD =

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3.510), indicating a moderate level of confidence in disease management with relatively small data distribution. Meanwhile, the average self-management score was 73.54 (SD = 10.911), showing that most respondents had moderate self-management abilities, with greater data distribution indicating variations in patients' self-management abilities in diabetes care. Table 2 provides further details.

Table 2

Univariate Analysis of Knowledge, Self-Efficacy, and Self-Management in Blood Glucose Control among Type 2 Diabetes Mellitus Patients in Bireuen Regency (n = 72)

Variables	Mean	Std. Dev.	Minimum	Maximum
Knowledge	13.60	2.516	8	20
Self-Efficacy	25.63	3.510	17	33
Self-Management	73.54	10.911	47	100

Based on age, respondents were dominated by the 46–55-year age group. In this group, the proportion of low knowledge was relatively higher (20.8%) compared to other categories. However, self-management in this age group tended to be in the moderate category (38.9%). Most respondents were female. Female respondents showed higher proportions in high knowledge (51.4%) and high self-efficacy (48.6%). Women (70.8%) also dominated moderate self-management, indicating better disease management abilities compared to men.

Married respondents had the highest proportions in high knowledge (41.7%), high self-efficacy (40.3%), and moderate self-management (52.8%). This finding suggests that married respondents tend to have better social support in disease management. Respondents with low educational backgrounds (elementary school) tended to have low knowledge (20.8%). In contrast, respondents with higher education (college/university) showed greater proportions of high knowledge (15.3%) and high self-efficacy (12.5%), indicating a relationship between educational level and the ability to understand and manage the disease.

In terms of occupation, housewives represented the largest proportion and showed dominance in high knowledge (31.9%), high self-efficacy (31.9%), and moderate self-management (44.4%). This indicates that involvement in household activities may allow respondents to focus more on daily disease management.

Based on the duration of diabetes mellitus, respondents who had suffered from diabetes for more than 5 years showed relatively balanced proportions between high and low knowledge (30.6% each) but had high self-efficacy (30.6%) and the most dominant moderate self-management (48.6%). This finding indicates that longer disease experience contributes to improving self-management abilities.

A similar pattern was observed regarding the duration of participation in the Prolanis program. Respondents who had participated for more than 2 years showed the highest proportions in high knowledge (38.9%), high self-efficacy (37.5%), and moderate self-management (59.7%). These findings indicate that longer participation in the Prolanis program contributes to improving respondents' capacity to understand and manage diabetes.

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Table 3
 Provides additional details

Respondent Characteristics	Knowledge		Self-Efficacy				Self-Management							
	Low f	High %	Low f	High %	Low f	High %	Low f	High %	Poor f	Moderate %	Good f	Good %		
Age														
26-35 years	0	0	2	2.8	0	0	2	2.8	0	0	1	1.4	1	1.4
36-45 years	5	6.9	6	8.3	3	4.2	8	11.1	0	0	9	12.5	2	2.8
46-55 Years	15	20.8	20	27.8	20	27.8	15	20.8	3	4.2	28	38.9	4	5.6
55-59 Years	13	18.1	11	15.3	13	18.1	11	15.3	6	8.3	16	22.2	2	2.8
Gender														
Male	2	2.8	2	2.8	3	4.2	1	1.4	1	1.4	3	4.2	0	0
Female	31	43.1	37	51.4	33	45.8	35	48.6	8	11.1	51	70.8	9	12.5
Marital Status														
Married	21	29.2	30	41.7	22	30.6	29	40.3	6	8.3	38	52.8	7	9.7
Widow	11	15.3	7	9.7	12	16.7	6	8.3	3	4.2	13	18.1	2	2.8
Widower	1	1.4	2	2.8	2	2.8	1	1.4	0	0	3	4.2	0	0
Educational Level														
No Formal Education	1	1.4	1	1.4	2	2.8	0	0	0	0	2	2.8	0	0
Elementary School/Equivalent	15	20.8	9	12.5	17	23.6	7	9.7	7	9.7	15	20.8	2	2.8
Junior High School/Equivalent	10	13.9	6	8.3	9	12.5	7	9.7	0	0	15	20.8	1	1.4
Senior High School/Equivalent	6	8.3	12	16.7	5	6.9	13	18.1	1	1.4	13	18.1	4	5.6
Academy/University	1	1.4	11	15.3	3	4.2	9	12.5	1	1.4	9	12.5	2	2.8
Occupation														
Civil Servant	2	2.8	10	13.9	4	5.6	8	11.1	2	2.8	8	11.1	2	2.8
Retired	0	0	1	1.4	0	0	1	1.4	0	0	1	1.4	0	0
Housewife	22	30.6	23	31.9	22	30.6	23	31.9	6	8.3	32	44.4	7	9.7
Farmer	9	12.5	3	4.2	9	12.5	3	4.2	1	1.4	11	15.3	0	0
Unemployed	0	0	2	2.8	1	1.4	1	1.4	0	0	2	2.8	0	0
Duration of Diabetes Mellitus														
<1 Year	1	1.4	2	2.8	2	2.8	1	1.4	0	0	3	4.2	0	0
>1<5 Years	10	13.9	15	20.8	12	16.7	13	18.1	6	8.3	16	22.2	3	4.2
>5 Years	22	30.6	22	30.6	22	30.6	22	30.6	3	4.2	35	48.6	6	8.3
Duration of Participation in Prolanis														
<1 Year	1	1.4	5	6.9	3	4.2	3	4.2	1	1.4	5	6.9	0	0
>1<2 Years	3	4.2	6	8.3	3	4.2	6	8.3	0	0	6	8.3	3	4.2
>2 Years	29	40.3	28	38.9	30	41.7	27	37.5	8	11.1	43	59.7	6	8.3

2. Discussion

Knowledge Among Type 2 DM Patients

The analysis results indicated that the knowledge level of type 2 DM patients had a mean score of 13.60, with a standard deviation of 2.516. This variation indicates differences in knowledge levels among respondents, although the distribution was relatively homogeneous. In general, these findings reflect that most patients had a moderate level of knowledge, although it had not yet been evenly distributed optimally. Therefore, the variation still found in this study indicates the need to improve knowledge through more structured and sustainable educational interventions.

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These findings are consistent with various studies showing that knowledge level is an important factor in the management of type 2 diabetes mellitus. Hailu et al. (2019) reported that Diabetes Self-Management Education (DSME) interventions significantly improved patient knowledge, self-care behavior, and self-efficacy. Similar findings were also emphasized by Ernawati et al. (2021) and Mikhael et al. (2020), who stated that structured educational programs were able to improve patients' understanding of the disease, treatment, and complication prevention. In addition, Mohamed et al. (2019), in their systematic review, found that most DSME interventions were effective in increasing patient knowledge, especially when implemented continuously and tailored to individual needs.

In addition to educational interventions, sociodemographic factors such as educational level, age, and occupation also play important roles in determining patients' knowledge levels. Respondents with higher educational backgrounds tend to have better abilities to receive and understand health information, which contributes to increased knowledge. In contrast, older age groups and individuals with lower educational levels often experience limitations in understanding complex health information.

Therefore, efforts to improve patient knowledge should prioritize health literacy strategies that are adjusted to educational background and age. Educational materials need to use simple language, visual explanations, and practical examples related to daily diabetes care, such as diet, medication adherence, blood glucose monitoring, and complication prevention. Family members can also be involved as information supporters, especially for patients with low educational levels, so that health messages are easier to understand and apply at home

Self-Efficacy Among Type 2 DM Patients

The analysis results showed that self-efficacy among type 2 DM patients had a mean score of 25.63 with a standard deviation of 3.510. This value indicates that the respondents' self-efficacy level was in the moderate category with relatively small variation, resulting in a relatively homogeneous data distribution. Nevertheless, the difference between the minimum and maximum scores indicates that there were still variations in patients' confidence levels in managing their disease.

Individual characteristics such as educational level, age, and social support play important roles in shaping patients' self-efficacy. Respondents with higher educational backgrounds tend to have a more profound understanding of health information, thereby increasing their confidence in managing the disease. Family support is also an important factor in strengthening self-efficacy, as demonstrated by Ramadhani et al. (2024), who found that family-based education significantly improved patients' self-efficacy and self-care behaviors. Peria-Purcell et al. (2025) also showed that the involvement of care supporters in diabetes education programs can positively affect the improvement of patients' self-efficacy in the short term.

However, the findings of this study indicate that patients' self-efficacy has not improved optimally despite having suffered from DM for a long time or participated in the Prolanis program. This suggests that improvements in self-efficacy are influenced not only by the duration of disease experience but also by the quality of interventions and educational approaches provided.

Thus, interventions to strengthen self-efficacy should focus on building patients' confidence through gradual goal setting, motivational counseling, and positive feedback from healthcare providers. Patients may be encouraged to set small achievable targets,

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such as improving meal regularity, checking blood glucose as scheduled, or increasing physical activity step by step. Peer support among Prolanis participants can also be used to share successful experiences, reduce fear of failure, and strengthen confidence in managing diabetes independently

Self-Management Among Type 2 DM Patients

The analysis results showed that self-management among type 2 DM patients had a mean score of 73.54 with a standard deviation of 10.911. This value indicates that the respondents' self-management level was in the moderate category with relatively greater variation compared to the other variables. The wide range of scores indicates considerable differences among patients in their ability to perform self-management activities, such as dietary regulation, adherence to therapy, blood glucose monitoring, and physical activity.

This finding is supported by the study of Hailu et al. (2019), which explained that Diabetes Self-Management Education (DSME) interventions significantly improved patients' self-care behaviors, including adherence to diet, medication, and foot care. This finding is reinforced by Ernawati et al. (2021) and Mohamed et al. (2019), who stated that structured and sustainable DSME programs are effective in improving patients' self-management abilities and contribute to better glycemic control.

In addition to educational interventions, self-management ability is also influenced by individual and environmental factors. Educational level, age, and social support play important roles in determining the success of patients in independently managing diabetes. Patients with higher educational backgrounds tend to have a more profound understanding of health information, enabling them to apply self-management behaviors more consistently. Family and social environmental support are also important factors in increasing patient motivation and adherence to therapeutic regimens.

Therefore, improvement of self-management should be directed toward practical and continuous assistance in daily diabetes care. Healthcare providers need to help patients develop individualized care plans that include meal planning, medication schedules, physical activity, blood glucose monitoring, and foot care. Follow-up through Prolanis activities, reminder systems, and periodic evaluation can help patients maintain consistent self-care behavior and reduce the risk of complications

Conclusion

Based on the results of this study, it can be concluded that the levels of knowledge, self-efficacy, and self-management among type 2 diabetes mellitus patients in rural areas of Aceh Province still vary and have not yet reached optimal and evenly distributed conditions among all respondents. At the knowledge level, respondents with low knowledge were still identified, indicating that health education has not been fully effective in reaching all community groups, particularly patients with low educational backgrounds and limited access to health information. Regarding self-efficacy, the findings indicate that patients' confidence in managing their disease still varies, which may affect the consistency of self-care behaviors. Meanwhile, patient self-management tended to be in the moderate category with considerable variation, indicating that independent diabetes management has not been performed optimally and sustainably.

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This study emphasizes that knowledge, self-efficacy, and self-management are interrelated components that play important roles in the successful control of type 2 diabetes mellitus. Improving knowledge alone is insufficient without strengthening self-efficacy and self-management abilities. Therefore, we urgently require more comprehensive community nursing interventions through structured, contextual, and sustainable educational programs that employ a community-based approach. These interventions are expected to improve patients' capacity to independently manage their disease, support blood glucose control, and reduce the risk of complications among type 2 diabetes mellitus patients in rural areas.

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