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The Relationship Between Education Level and Self-Management on Blood Sugar Levels in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Introduction: *Diabetes Mellitus (DM) is a chronic, non-communicable disease with an incidence that continues to rise steadily. Inadequate adherence to disease management often linked to lower levels of education can result in poor blood glucose control*
Objectives: *This study aims to investigate the relationship between educational level and self-management practices in relation to blood glucose levels among patients with type 2 diabetes mellitus.*
Methods: *This study employed a quantitative descriptive design with a cross-sectional approach. The sample consisted of 84 patients with type 2 diabetes mellitus, selected through accidental sampling. Data were collected using a questionnaire and analyzed using the Chi-square test*
Results: *The results showed that the majority of respondents (52.4%) had a secondary level of education, 44.0% demonstrated adequate diabetes self-management skills, and 64.3% had uncontrolled blood sugar levels. Statistical analysis revealed a significant relationship between education level and self-management skills with blood sugar levels in patients with type 2 diabetes mellitus.*
Conclusions: *A higher level of education enables individuals to more easily understand and effectively implement self-management practices, thereby contributing to better blood sugar control.*
Keyword: *Diabetes Mellitus, Blood Sugar Levels, Self-Management, Education Level*

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Introduction

Diabetes Mellitus (DM) is one of the non-communicable diseases whose number of sufferers continues to increase from year to year. This disease requires long-term care which includes blood glucose control and strategies for reducing the risk of complications. According to data from the International Diabetes Federation (IDF), in 2021 there were around 537 million people diagnosed with diabetes mellitus in the world, and it is estimated that this number will increase in 2024 to 783 million, dominated by ages 20-79 years, influenced by unhealthy lifestyles, genetic factors, socioeconomic factors, and the environment (Artini et al., 2023).

Diabetes Mellitus is developing at an alarming rate worldwide, including Indonesia. In Indonesia, the incidence rate of DM is also continuing to increase. In Indonesia, the prevalence of diabetes mellitus was recorded at 11.3%, making it one of the countries with the highest prevalence rate in Southeast Asia. According to the latest data, diabetes mellitus ranks fourth as the main cause of death (Idris & Sari, 2022). This confirms the need for effective and integrated handling to manage this disease.

One of the serious impacts of uncontrolled diabetes mellitus is the occurrence of various life-threatening health complications. Non-adherence to disease management, which is often caused by low levels of education, can result in poor blood glucose control. Research shows that individuals with lower education tend to have less understanding of diabetes management, leading to a higher risk of complications such as neuropathy, retinopathy, and cardiovascular disease (Saibi et al., 2020). herefore, it is important to increase education and awareness about diabetes, especially among those with low educational status.

One of the key factors influencing control over diabetes is the patient's education level. Research results show that individuals with a higher education background tend to have better knowledge and understanding of managing diabetes mellitus, including in terms of

appropriate diet and physical activity (Idris & Sari, 2022). In other words, good education can play a crucial role in improving self-management which leads to diabetes control. In this context, self-management is very important for sufferers to be able to control their blood sugar levels effectively, prevent complications, and improve their quality of life (Susilawati et al., 2023) ; (Niswatin & Purwanti, 2024).

A higher education level provides access to relevant information and resources for effective diabetes management. Good knowledge will influence patients' attitudes towards treatment and healthy lifestyle habits, which can ultimately lower their blood sugar levels. Self-management shows an influence on blood sugar control in type II diabetes mellitus patients, which indicates that the success of diabetes management depends on the integration of good knowledge and its application in daily activities (Yustina & Tuharea, 2021; Simon, 2020).

The importance of this research is to provide a clearer picture of how much influence education level and self-management have on blood sugar levels in type 2 diabetes patients. With a better understanding of this relationship, more effective interventions can be developed, including educational programs designed to improve diabetes patients' self-management skills. Starting from this, the researcher is interested in raising the research topic entitled "The Relationship Between Education Level and Self-Management on Blood Sugar Levels in Type 2 Diabetes Mellitus Patients".

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Method

The design in this study used descriptive quantitative with a cross-sectional approach. The research location was in the Working Area of the Telaga Dewa Community Health Center, Bengkulu City. The research was conducted in May 2025.. The population in this study were all diabetes mellitus patients in the Working Area of the Telaga Dewa Community Health Center, Bengkulu City in 2024, totaling 336 patients. Sampling used an accidental sampling technique with a sample size of 84 respondents. Data collected was in the form of primary data and secondary data. Primary data was collected by measuring education level, Self-Management using the Self Management Questionnaire (DSMQ) which contained 16 questions, and blood sugar levels in patients taken when the patient was fasting for 8 hours (fasting blood sugar level). Secondary data was obtained by looking at patient medical records. The chi-square test was used for bivariate data analysis. This research has received ethical approval from the Research Ethics Committee of STIKES Tri Mandiri Sakti Bengkulu and is declared to comply with the principles of research ethics according to applicable standards (ethics approval number: 001179/KEPK STIKES TMS BENGKULU/2025).

Results

Univariate Analysis:

This study shows an overview of respondents based on the level of knowledge, self-management ability, and blood sugar levels of type 2 DM patients.

3.1 Overview of Education Level in Type 2 Diabetes Mellitus Patients

Table 1. Frequency Distribution of Education Level in Diabetes Mellitus Patients

Education Level	Frequency	Percentage (%)
Low	22	26.2
Medium	44	52.4
High	18	21.4
Total	84	100

Table 1 shows that most respondents, namely 44 people (52.4%), have a secondary education level.

3.2 Description of Self-Management in Type 2 Diabetes Mellitus Patients

Table 2. Frequency Distribution of Self-Management in Diabetes Mellitus Patients

Self-Management	Frequency	Percentage (%)
Poor	26	31.0
Sufficient	37	44.0
Good	21	25.0
Total	84	100

Table 2 above shows that most respondents, namely 37 people (44.0%), have sufficient diabetes self-management ability.

3.3 Description of Blood Sugar Levels in Type 2 Diabetes Mellitus Patients

Table 3. Frequency Distribution of Blood Sugar Levels in Diabetes Mellitus Patients

Blood Sugar Level	Frequency	Presentation (%)
Uncontrolled	54	64.3
Controlled	30	35.7
Total	84	100

Table 3 above shows that most respondents, namely 54 people (64.3%), had uncontrolled blood sugar levels.

Bivariate Analysis:

3.4. Relationship Between Education Level and Blood Sugar Levels In Type 2 Diabetes Mellitus Patients

Table 4 Relationship Between Education Level And Blood Sugar Levels In Diabetes Mellitus Patients

Education Level	Blood Sugar Level				Total		P Value
	Uncontrolled		Controlled				
	F	%	F	%	F	%	
Low	18	81.8	4	18.2	22	100	0,001
Medium	35	79.5	9	20.5	44	100	
High	1	5.6	17	94.4	18	100	
Total	54	64.3	30	35.7	84	100	

Table 4 above shows that of 22 respondents with a low education level, most or 18 people (81.8%) had uncontrolled blood sugar levels. Meanwhile, of 44 respondents with a middle education level, the majority, 35 people (79.5%), also experienced uncontrolled blood sugar levels. However, of 18 respondents with a high education level, almost all, namely 17 people (94.4%), had controlled blood sugar levels. Based on statistical test results with a *p* value of 0.001 (<0.05), it can be concluded that there is a significant relationship between the education level and blood sugar levels in diabetes mellitus patients.

3.5. The Relationship of Self-Management with Blood Sugar Levels in Type 2 Diabetes Mellitus Patient

Table 5. Relationship of Self-Management with Blood Sugar Levels in Diabetes Mellitus Patients

Self-Management	Blood Sugar Level				Total		P Value
	Uncontrolled		Controlled				
	F	%	F	%	F	%	
Poor	24	92.3	2	7.7	26	100	0,001
Sufficient	26	70.3	11	29.7	37	100	
Good	4	19.0	17	81.0	21	100	
Total	54	64.3	30	35.7	84	100	

Table 5 above indicates that of 26 respondents with poor self-management skills, most (24, 92.3%) respondents had uncontrolled blood sugar levels. Meanwhile, of 37 respondents with adequate self-management, the majority (26, 70.2%) had uncontrolled blood sugar levels, while of 21 respondents with good self-management, most (17, 81.0%) had controlled blood sugar levels. Based on the statistical test results, a p-value of 0.001 ($p<0.05$) was obtained, which indicates a significant relationship between self-management and blood sugar levels in diabetes mellitus patients.

Discussion

Respondent characteristics based on education level, self-management and blood glucose levels

The results of this study show that most respondents with secondary education levels have sufficient diabetes self-management skills and uncontrolled blood sugar levels. The majority of type 2 diabetes mellitus patients have a high school education level (52.83%), this proportion has the potential to influence the knowledge and understanding of type 2 diabetes mellitus sufferers regarding this disease (Firdiawan et al., 2023). This finding is in line with research by Ardilla et al (2024), it is known that most type 2 DM patients have a high school education (58%). Research by Masi et al (2020) shows that the majority of diabetes mellitus patients, 67.7%, have adequate diabetes self-management, while in research conducted by Hananto et al (2022), it is known that the self-management of the majority of Type 2 DM patients is quite good. This is supported by research by Ardilla et al (2024), where most self-care activities are at a medium level (86.4%). The research results of Afiana et al., (2023), show that the majority, as many as 68% of Type 2 DM patients with abnormal fasting blood sugar levels with an average fasting blood sugar value of 190 mg/dL which is an uncontrolled category. Data on blood sugar measurements in the study indicate that blood glucose parameters are closely related to lifestyle and adherence to medical management (Sembiring et al., 2024; Roniawan et al., 2021).

Relationship Between Education Level and Blood Sugar Levels In Type 2 Diabetes Mellitus Patients

The results of this study show that there is a significant relationship between education level and blood sugar levels in diabetes mellitus patients. Research conducted by (I. Wulandari et al., 2021) supports this by finding that diabetes mellitus patients who have a formal education background, especially university graduates, tend to have more stable blood sugar levels compared to patients who do not have a formal education.

These findings are in line with the results of research by Idris & Sari (2022) which shows that individuals who have a higher education level have better knowledge about health and diabetes, which contributes to more effective disease management. Effective education related to diabetes management, including diet and exercise, can help individuals control their blood sugar levels (S. Wulandari & Akrom, 2022; (Saibi et al., 2020). This indicates that targeted health education for community groups with low education is very important to prevent complications related to diabetes.

Individuals with lower education levels tend to have less understanding related to diabetes management, which leads to poor blood glucose control. This potentially causes complications such as neuropathy, retinopathy, and cardiovascular disease (Lukandy & Albar, 2020 ; Saibi et al., 2020). Conversely, individuals with higher education are better able to understand information about their disease and are more likely to follow medical recommendations (Saragih et al., 2024; Fatimah & Sofiyat, 2023).

Research by Krzemińska et al., (2021) shows that diabetes mellitus patients with a higher level of education are usually more compliant in undergoing treatment and self-care. This compliance has a positive impact on controlling blood sugar levels. A high level of education is generally accompanied by a better understanding of health issues, including efforts to prevent

and manage diabetes. This is also related to increased access to health information and medical services. In addition, other aspects such as lifestyle, diet, and physical activities such as exercise are often influenced by a person's level of education. For example, people with higher education levels are generally more aware of the importance of a healthy diet and regular exercise, two things that are crucial in managing diabetes.

According to the results of research conducted by Nasution et al., (2022) described that demographic characteristics, including education level, have a correlation with DM management among patients. Teages Adgoy et al., (2021) mentioned that the education level functions as an important factor influencing knowledge, attitudes, and practices around DM management, including understanding regarding the appropriate and suitable diet and medication. Good awareness and understanding are very important for patients in making prevention efforts and making better decisions related to diabetes management (Chen et al., 2021).

Overall, there is strong evidence that education plays a key role in the management of diabetes mellitus. Conveying knowledge about DM, healthy lifestyle behaviors, and understanding the importance of diabetes care can reduce complications, especially in patients with diabetic ulcers, where further complications include the risk of amputation, thus appropriate wound care therapy is needed, one of which is the use of honey which is proven to accelerate the wound healing process and improve the patient's quality of life (Regassa Feyisa, 2022; Sari et al, 2024). Therefore, it is important for healthcare providers to strengthen education programs based on the patient's education level to ensure that the information provided can be received and applied effectively (I. Wulandari et al., 2021).

The Relationship of Self-Management with Blood Sugar Levels in Type 2 Diabetes Mellitus Patient

The results of this study show that there is a significant relationship between self-management and blood sugar levels in diabetes mellitus patients. This text indicates that good self-management skills play an important role in helping patients control their blood glucose levels more effectively (Passos Trindade & Bonacina, 2024). This is in line with research showing that the inability to perform self-management can lead to uncontrolled blood glucose levels, contributing to long-term diabetes complications (Diriba et al., 2020; Becker et al., 2020).

The management of diabetes mellitus does not only rely on medication, but also requires effective patient self-management. Self-management, which includes patient education, adequate food intake, physical activity, and blood glucose monitoring, has a significant relationship with blood glucose control in diabetic patients. First, good blood glucose control requires a deep understanding of the disease and the impact of a healthy lifestyle. Research by Stella et al., (2023) shows that effective education can help increase patients' knowledge and awareness about managing their diabetes better, which in turn will affect their habits regarding diet and physical activity. Patients who are active in self-management activities tend to be more successful in maintaining glucose within the normal range. In addition, continuous monitoring of blood glucose levels is an important part of diabetes management.

Professional organizations American Diabetes Association (ADA) and American Association of Clinical Endocrinologists (AACE) recommend a target glucose level between 140-180 mg/dL without causing hypoglycemia in most critically ill patients (Decroli., 2019).

Performing blood sugar monitoring, managing diet, physical activity, and foot care are crucial for preventing diabetes complications and improving patient quality of life(Ketema et al., 2020). Buerger Allen Exercise can improve peripheral blood flow in the feet, which is an effort to prevent complications due to circulatory disorders in the feet (Sari et al., 2025). Prevention interventions for patients must be routine, these actions include specific instructions about foot inspection, foot examination, calluses, appropriate shoe and sock use (Bryant & Nix, 2016). In addition, prevention efforts against amputation also need to be carried out by implementing complementary therapies in wound management, such as the use of honey, as per research conducted by (Sari, Dahlia, et al., 2024) shows that honey can improve the healing process of diabetic ulcers.

This finding is reinforced by research by Sari et al., (2024) which shows that most diabetes mellitus patients have a poor quality of life.,Patients who apply good self-care practices tend to show better glycemic control, which is blood sugar levels within the normal range, and reduce the risk of long-term complications (Bukhsh et al., 2020).

Appropriate dietary management is also very influential. A balanced and regular food intake, as well as good food choices, help prevent blood sugar spikes after eating. In the context of diabetes management, physical activity also plays an important role. Research shows that regular exercise can increase insulin sensitivity and help maintain blood sugar (Hadi et al., 2019). Through routine physical activity, diabetes patients can help improve their metabolism and maintain a stable body weight, two things that are very instrumental in preventing and managing type 2 diabetes mellitus.

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Conclusions and Suggestions

Based on the research results, it can be concluded that there is a relationship between education level and self-management with blood sugar levels in patients with Type 2 diabetes mellitus. The level of education plays a role in shaping understanding and application of self-management in daily life, which ultimately affects the patient's ability to control blood sugar levels, especially in people with type 2 diabetes mellitus. It is hoped that these findings can be a basis for decision making, especially in designing appropriate interventions for diabetes patients at the Telaga Dewa Health Center, Bengkulu. In addition, the results of this study can also be a foothold for subsequent researchers to explore more deeply issues related to diabetes mellitus.

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