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Factors Associated with Glycemic Control (Hba1c) Among Patients With Type 2 Diabetes Mellitus: A Cross-Sectional Study

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Abstract: Type 2 Diabetes Mellitus (T2DM) is a chronic disease with an increasing prevalence and can lead to various complications when optimal glycemic control is not achieved. Glycemic control is influenced by various behavioral and psychosocial factors. This study aimed to analyze factors associated with glycemic control among patients with T2DM at Simpang Empat Community Health Center, Tanah Bumbu Regency. This study employed a quantitative design with a cross-sectional approach. The sample consisted of 89 respondents who met the inclusion criteria and were selected using purposive sampling. The study variables included age, dietary pattern, physical activity, stress level, and family support, while glycemic control was assessed based on HbA1c levels. Data were analyzed using the Spearman Rank test and multiple linear regression analysis. The results showed significant associations between dietary pattern, stress level, and family support and glycemic control ($p<0.05$), whereas age and physical activity were not significantly associated with glycemic control ($p>0.05$). Multivariate analysis indicated that family support was the most dominant factor associated with glycemic control after controlling for other variables. In conclusion, dietary pattern, stress level, and family support were associated with glycemic control, with family support being the most dominant factor. Nurses should develop interventions involving family support, dietary education, and stress management to promote optimal glycemic control.

Keywords: Type 2 Diabetes Mellitus; glycemic control; dietary pattern; stress level; family support.

1. INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is one of the non-communicable diseases with an increasing prevalence and has become a public health problem in many countries (Pangestika et al., 2022; Ramadhan & Taruna, 2022; Hendrik, Nirwana, 2024). According to WHO, more than 830 million people live with diabetes, and more than 95% of them have T2DM. Chronic hyperglycemia caused by impaired insulin secretion and/or insulin resistance increases the risk of microvascular and macrovascular complications, contributing to high morbidity and mortality. Therefore, glycemic control is a major goal in the management of T2DM. One recommended indicator for evaluating diabetes control is glycated hemoglobin (HbA1c), because it reflects average blood glucose levels over the previous two to three months (Bin Rakhis et al., 2022). (Kunutsor et al., 2024) reported that achieving HbA1c targets is associated with a lower risk of diabetes complications and better clinical outcomes.

In Indonesia, Diabetes Mellitus remains a priority disease, with the number of cases continuing to increase. A similar condition occurs in South Kalimantan Province, where Diabetes Mellitus ranks second among non-communicable diseases after hypertension. In Tanah Bumbu Regency, the number of patients increased from 5,345 cases in 2022 to 6,147 cases in 2024, while 845 patients with Diabetes Mellitus were recorded in the Simpang Empat Primary Health Center working area in the same year. This condition indicates that diabetes management at the primary healthcare level remains a challenge and that identification of factors associated with glycemic control is needed as a basis for developing more effective interventions.

Previous studies indicate that glycemic control is influenced by biological, behavioral, and psychosocial factors. (Maydyani & Yoli Farradika, 2023) stated that glycemic control is influenced by interactions among multiple biological and behavioral factors; physical activity, for example, contributes to improved glycemic control by increasing insulin sensitivity. (Metreveli & Sciences, 2022) explained that stress increases cortisol secretion, which may reduce insulin sensitivity and

consequently increase blood glucose levels. Meanwhile, (Waetenrisompa et al., 2024) reported that family support plays an important role in successful glycemic control by improving patients' adherence to therapy and disease management.

However, previous studies have generally examined these factors separately. (Warmi Hernida et al., 2020) examined only the relationship between dietary patterns and blood glucose levels. (Waetenrisompa et al., 2024) examined only the relationship between family support and medication adherence with blood glucose levels and used a relatively small sample. (Irfan et al., 2025) examined age, obesity, and hypertension in relation to glycemic control without including psychosocial factors. (Intan Suri et al., 2024) focused only on the relationship between stress level and blood glucose levels, whereas (Ramadhani & Adrian, 2022) examined physical activity alone. These findings indicate that most previous studies evaluated individual factors separately and therefore have not provided a comprehensive picture of the determinants of glycemic control among patients with T2DM.

Based on these previous studies, a research gap remains because few studies have integrated biological factors (age), behavioral factors (dietary pattern and physical activity), and psychosocial factors (stress level and family support) into a single analytical model, particularly among patients with T2DM in primary healthcare in Tanah Bumbu Regency. In addition, few studies have identified the most dominant factor associated with glycemic control using multivariate analysis in this population.

The novelty of this study lies in the simultaneous analysis of age, dietary pattern, physical activity, stress level, and family support as determinants of glycemic control based on HbA1c levels. This study not only analyzes the association of each variable with glycemic control but also identifies the most dominant factor through multivariate analysis. In addition, the study uses Roy Adaptation Theory, developed by Sister Callista Roy, as a conceptual foundation to explain how an individual's ability to adapt to biological, behavioral, and psychosocial stimuli may influence successful management of T2DM.

Based on the above description, this study aimed to analyze factors associated with glycemic control based on HbA1c levels among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu Regency. Specifically, this study analyzed the associations of age, dietary pattern, physical activity, stress level, and family support with glycemic control and identified the most dominant factor associated with glycemic control. The findings are expected to provide a basis for developing more comprehensive, family-centered nursing interventions appropriate for primary healthcare settings.

2. METHODS

This quantitative study used a cross-sectional design. The study was conducted in the working area of Simpang Empat Primary Health Center, Tanah Bumbu Regency, from May to June. The study population consisted of all patients with Type 2 Diabetes Mellitus receiving treatment at Simpang Empat Primary Health Center. A total of 89 respondents were selected using purposive sampling based on the inclusion and exclusion criteria. The independent variables were age, dietary pattern, physical activity, stress level, and family support, while the dependent variable was glycemic control measured by HbA1c testing. Data on dietary pattern, physical activity, stress level, and family support were obtained using questionnaires that had undergone validity and reliability testing. Data were analyzed using univariate analysis, bivariate analysis with the Spearman Rank test, and multivariate analysis using multiple linear regression, with a significance level of $p < 0.05$. The study received ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Banjarmasin, approval number 119/UMB/KE/IV/2026.

Respondent Characteristics
Univariate Analysis
Table 1. Frequency Distribution of Respondents by Age

No	Category	Frequency	Percentage (%)
1	Adults (19–59 years)	60	67.4%
2	Older adults (>60 years)	29	32.6%
	Total	**89**	**100%**

Based on Table 1, most respondents were adults aged 19–59 years, with 60 respondents (67.4%), while 29 respondents (32.6%) were aged >60 years. The total number of respondents was 89 (100%).

Table 2. Frequency Distribution of Respondents by Sex

No	Category	Frequency	Percentage (%)
1	Male	31	34.8%
2	Female	58	65.2%
	Total	**89**	**100%**

Based on Table 2, most respondents were female, with 58 respondents (65.2%), while 31 respondents (34.8%) were male. The total number of respondents was 89 (100%).

Table 3. Frequency Distribution of Respondents by Dietary Pattern

No	Category	Frequency	Percentage (%)
1	Poor	20	22.5%
2	Moderate	51	57.3%
3	Good	18	20.2%
	Total	**89**	**100%**

Based on Table 3, most respondents had a moderate dietary pattern, with 51 respondents (57.3%), followed by a poor dietary pattern in 20 respondents (22.5%) and a good dietary pattern in 18 respondents (20.2%). The total number of respondents was 89 (100%).

Table 4. Frequency Distribution of Respondents by Physical Activity

No	Category	Frequency	Percentage (%)
1	Heavy	22	24.7%
2	Moderate	38	42.7%
3	Light	29	32.6%
	Total	**89**	**100%**

Based on Table 4, most respondents had a moderate level of physical activity, with 38 respondents (42.7%), followed by light activity in 29 respondents (32.6%) and heavy activity in 22 respondents (24.7%). The total number of respondents was 89 (100%).

Table 5. Frequency Distribution of Respondents by Stress Level

No	Category	Frequency	Percentage (%)
1	High	3	3.4%
2	Moderate	65	73.0%
3	Low	21	23.6%
	Total	**89**	**100%**

Based on Table 5, most respondents had a moderate stress level, with 65 respondents (73.0%), followed by low stress in 21 respondents (23.6%) and high stress in 3 respondents (3.4%). The total number of respondents was 89 (100%).

Table 6. Frequency Distribution of Respondents by Family Support

No	Category	Frequency	Percentage (%)
1	Poor	2	2.2%
2	Moderate	26	29.2%
3	Good	61	68.5%
	Total	**89**	**100%**

Based on Table 6, most respondents had good family support, with 61 respondents (68.5%), followed by moderate family support in 26 respondents (29.2%) and poor family support in 2 respondents (2.2%). The total number of respondents was 89 (100%).

Table 7. Frequency Distribution of Respondents' HbA1c Levels

No	HbA1c	Frequency	Percentage (%)
1	4.9	2	2.2%
2	5.0	2	2.2%
3	5.2	1	1.1%

No	HbA1c	Frequency	Percentage (%)
4	5.5	3	3.4%
5	5.6	2	2.2%
6	5.7	3	3.4%
7	5.8	4	4.5%
8	5.9	4	4.5%
9	6.0	1	1.1%
10	6.1	5	5.6%
11	6.2	3	3.4%
12	6.4	1	1.1%
13	6.5	1	1.1%
14	6.6	1	1.1%
15	6.7	3	3.4%
16	6.8	4	4.5%
17	6.9	1	1.1%
18	7.0	1	1.1%
19	7.2	3	3.4%
20	7.3	2	2.2%
21	7.5	5	5.6%
22	7.6	2	2.2%
23	7.8	3	3.4%
24	8.0	3	3.4%
25	8.1	3	3.4%
26	8.2	1	1.1%
27	8.4	4	4.5%
28	8.5	4	4.5%
29	9.0	1	1.1%
30	9.2	1	1.1%
31	9.3	2	2.2%
32	9.5	3	3.4%
33	9.6	1	1.1%
34	10.2	1	1.1%
35	10.3	3	3.4%
36	10.4	1	1.1%
37	10.5	1	1.1%
38	10.6	1	1.1%
39	11.2	2	2.2%
	Total	**89**	**100%**

Based on Table 7, respondents' HbA1c levels ranged from 4.9% to 11.2%. The most frequently observed HbA1c levels were 6.1% and 7.5%, each occurring in 5 respondents (5.6%). HbA1c levels of 5.8%, 5.9%, 6.8%, 8.4%, and 8.5% each occurred in 4 respondents (4.5%). Most respondents had HbA1c values ranging from 6.0% to 8.5%, indicating that the majority had suboptimal glycemic control. The lowest HbA1c value, 4.9%, was found in 2 respondents (2.2%), while the highest value, 11.2%, was found in 2 respondents (2.2%). Other HbA1c values occurred in 1–3 respondents, with percentages ranging from 1.1% to 3.4%. The total number of respondents was 89 (100%).

Bivariate Analysis

Table 8. Association between Age and Glycemic Control (HbA1c)

Variable	r (Spearman's rho)	p-value
Age and glycemic control (HbA1c)	-0.173	0.106

The analysis showed a p-value of 0.106 ($p > 0.05$) and a correlation coefficient of -0.173 among 89 respondents. Because the p-value was >0.05, there was no significant association between age and glycemic control (HbA1c).

Table 9. Association between Dietary Pattern and Glycemic Control (HbA1c)

Variable	r (Spearman's rho)	p-value
Dietary pattern and glycemic control (HbA1c)	-0.278	0.008

The analysis showed a p-value of 0.008 ($p < 0.05$) and a correlation coefficient of -0.278 among 89 respondents. Because the p-value was <0.05, there was a significant association between dietary pattern and glycemic control (HbA1c).

Table 10. Association between Physical Activity and Glycemic Control (HbA1c)

Variable	r (Spearman's rho)	p-value
Physical activity and glycemic control (HbA1c)	0.083	0.440

The analysis showed a correlation coefficient of 0.083 and a p-value of 0.440 ($p > 0.05$). These findings indicate that there was no significant association between physical activity and glycemic control (HbA1c) among patients with Diabetes Mellitus.

Table 11. Association between Stress Level and Glycemic Control (HbA1c)

Variable	r (Spearman's rho)	p-value
Stress level and glycemic control (HbA1c)	0.215	0.043

The analysis showed a correlation coefficient of 0.215 and a p-value of 0.043 ($p < 0.05$). These findings indicate a significant association between stress level and glycemic control (HbA1c) among patients with Diabetes Mellitus.

Table 12. Association between Family Support and Glycemic Control (HbA1c)

Variable	r (Spearman's rho)	p-value
Family support and glycemic control (HbA1c)	-0.222	0.036

The analysis showed a p-value of 0.036 ($p < 0.05$) and a correlation coefficient of -0.222 among 89 respondents. Because the p-value was <0.05, there was a significant association between family support and glycemic control (HbA1c).

Multivariate Analysis

Table 13. Results of Multiple Linear Regression Analysis of Factors Associated with Glycemic Control (HbA1c)

Variable	B	Beta	t	p-value
Age	-0.531	-0.155	-1.572	0.120
Dietary pattern	-0.528	-0.215	-2.121	0.037
Physical activity	0.125	0.059	0.591	0.556
Stress level	0.694	0.207	2.098	0.039

Variable	B	Beta	t	p-value
Family support	-0.775	-0.250	-2.473	0.015
Constant	9.426	–	7.120	0.000

The analysis showed that dietary pattern ($p = 0.037$), stress level ($p = 0.039$), and family support ($p = 0.015$) were significantly associated with glycemic control (HbA1c) after controlling for the other variables. Age ($p = 0.120$) and physical activity ($p = 0.556$) were not significantly associated with glycemic control after adjustment for the other variables.

Family support had the largest standardized beta coefficient ($\beta = -0.250$), indicating that it was the most dominant factor associated with glycemic control (HbA1c) among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu. The negative regression coefficient indicates that better family support tended to be associated with lower HbA1c values and therefore better glycemic control.

Multivariate analysis was conducted using multiple linear regression, with dietary pattern, stress level, and family support entered as candidate variables. The multiple linear regression model was statistically significant, with $F = 4.121$ and $p = 0.002$ ($p < 0.05$), indicating that dietary pattern, stress level, and family support were jointly associated with glycemic control (HbA1c). The coefficient of determination (R^2) was 0.191, indicating that 19.1% of the variation in glycemic control (HbA1c) could be explained by dietary pattern, stress level, and family support, while the remaining 80.9% was attributable to other factors not examined in this study.

3. DISCUSSION

Dietary Pattern and Glycemic Control (HbA1c) among Patients with T2DM

Univariate analysis showed that the most common dietary pattern among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu Regency, was the moderate category, reported by 51 respondents (57.3%). Bivariate analysis demonstrated a significant association between dietary pattern and glycemic control (HbA1c), with $p = 0.008$ and $r = -0.278$. The negative correlation indicates an inverse relationship between the two variables: as dietary management improves, HbA1c tends to decrease, indicating better glycemic control.

The finding is consistent with previous studies reporting significant associations between dietary patterns and HbA1c or blood glucose levels (Ischak et al, 2024; Jazila, 2024; Harna et al., 2024; Astutisari et al., 2022). Dietary management involving the amount, type, and timing of food intake plays an important role in maintaining stable blood glucose levels through regulation of carbohydrate, fat, and fiber intake. Although some studies have reported different findings (Karipidou et al., 2025; Islam et al., 2021), the present findings reinforce the role of dietary management as an important component of T2DM management.

The findings may also serve as a basis for primary health centers to develop nutrition education and dietary counseling programs for patients with T2DM. Such efforts are expected to improve glycemic control and reduce the risk of diabetes complications. According to Roy Adaptation Theory, patients with T2DM are required to adapt to changes in their health condition through behavioral modification, particularly dietary management. Adaptation includes the ability to regulate the type, amount, and composition of food according to metabolic needs. Reducing high-sugar foods, limiting processed foods and sugary beverages, and increasing balanced nutritional intake represent adaptive responses that can help maintain stable blood glucose levels. Successful adaptation to recommended dietary practices may therefore contribute to improved glycemic control and prevention of diabetes complications.

Stress Level and Glycemic Control (HbA1c) among Patients with T2DM

Univariate analysis showed that a moderate stress level was the most common category among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu Regency, with 65 respondents (73.0%). Bivariate analysis demonstrated a significant association between stress level and glycemic control (HbA1c), with $p = 0.043$ and $r = 0.215$.

The results indicate that higher stress levels tend to be associated with higher HbA1c values and poorer glycemic control. This finding is consistent with previous studies reporting significant associations between stress levels and blood glucose or HbA1c (Ulyanah et al., 2026; Sutrisno, Oktha Alfiani, 2024; Virgo et al., 2024; Zaman et al., 2023; Muhammad Gugun et al., 2025). Physiologically, stress activates neuroendocrine responses that increase cortisol and catecholamine

secretion, thereby increasing insulin resistance and hepatic glucose production, which may lead to increased HbA1c. Although some studies have reported no significant association (Savitri et al., 2025), differences may be related to respondent characteristics and measurement indicators.

Although the correlation was weak (r = 0.215), the positive direction indicates that increasing stress tends to be accompanied by poorer glycemic control. Previous studies have similarly reported significant correlations between stress and blood glucose or HbA1c among patients with T2DM. The relationship between stress and glycemic control can be explained through physiological and behavioral mechanisms. Physiologically, stress activates the hypothalamic–pituitary–adrenal (HPA) axis, increasing cortisol and other counter-regulatory hormones. These hormones stimulate hepatic gluconeogenesis and reduce tissue insulin sensitivity, resulting in decreased cellular glucose uptake and increased blood glucose levels. When stress persists, sustained increases in blood glucose may be reflected by higher HbA1c levels as an indicator of long-term glycemic control.

Stress may also influence glycemic control through behavioral changes. Individuals experiencing stress may have reduced capacity for self-care, including lower adherence to diabetes dietary recommendations, irregular use of antidiabetic medication, reduced physical activity, and less consistent health monitoring or glucose monitoring. These changes may make diabetes management less effective and contribute to poorer glycemic control.

The nursing implication is that nurses should address not only patients' physical conditions but also their psychological well-being. Nurses can periodically assess stress levels and provide education on effective stress-management strategies. Patient education should also include stress management and strengthening social support to support better blood glucose control and reduce the risk of diabetes complications. According to Roy Adaptation Theory, stress is a contextual stimulus that can influence the adaptive capacity of patients with T2DM. Poorly managed stress may produce maladaptive responses that disturb physiological balance through increased stress hormones, contributing to elevated blood glucose and HbA1c. When adaptation mechanisms are effective, individuals may maintain self-care behaviors such as dietary adherence and glucose monitoring, thereby preserving glycemic control. Effective stress management is therefore an important component of achieving optimal glycemic control.

Family Support and Glycemic Control (HbA1c) among Patients with T2DM

Univariate analysis showed that good family support was the most common category among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu Regency, with 61 respondents (68.5%). Bivariate analysis demonstrated a significant association between family support and glycemic control (HbA1c), with p = 0.036 and r = -0.222. The results indicate that family support is significantly associated with glycemic control among patients with T2DM. This finding is consistent with previous studies (Ersawati & Rosyid, 2024; Alaofè et al., 2025; Waetenrisompa et al., 2024) which reported that patients receiving good family support were more likely to achieve optimal glycemic control. Family support may improve adherence to dietary management, medication use, physical activity, and blood glucose monitoring, thereby contributing to lower HbA1c values. Although one study found no significant association between family support and glycemic control (Jannah et al., 2024), the present findings support the role of family support as an important psychosocial factor in T2DM management.

Family support may encourage patients with T2DM to adopt healthy lifestyles and use healthcare services. Such support may help patients manage their condition more effectively, thereby maintaining better glycemic control and HbA1c levels. Family support is an important psychosocial aspect of successful T2DM management. Family involvement through emotional, informational, instrumental, and appraisal support may help patients maintain health behaviors that support glycemic control. Therefore, healthcare professionals should develop family-based approaches to diabetes education and patient support.

Roy Adaptation Theory views humans as adaptive systems that continuously interact with their environment. Contextual stimuli such as family support can influence a patient's ability to adapt to a chronic disease. Patients with T2DM need to make behavioral changes as adaptive responses, including modifying dietary patterns, increasing physical activity, adhering to treatment, and monitoring blood glucose regularly. When families provide positive support, coping mechanisms and the adaptation process may be strengthened, enabling effective adaptive responses such as adherence to diabetes management and better glycemic control. Conversely, inadequate family support may increase the risk of non-adherence, persistently elevated blood glucose, and higher HbA1c levels.

Physical Activity and Glycemic Control (HbA1c) in Patients with Type 2 Diabetes Mellitus

The univariate analysis showed that most respondents had moderate physical activity (42.7%). However, no significant association was found between physical activity and glycemic control (HbA1c) ($p=0.440$; $r=0.083$). This finding is consistent with (Lestari et al., 2021) and Meisinger et al. (2020), who also reported no significant association between physical activity and HbA1c. In contrast, (Ramadhani & Adrian, 2022) found a significant association between physical activity and blood glucose levels ($p=0.001$). These differences may be related to variations in respondent characteristics, activity intensity and duration, measurement instruments, and glycemic indicators. Moreover, HbA1c reflects longer-term glycemic status and may be influenced by dietary patterns, treatment adherence, stress, medication, and family support. According to Roy's Adaptation Model, physical activity supports physiological adaptation to T2DM by promoting glucose utilization and metabolic balance. However, the absence of a significant association in this study suggests that glycemic control is influenced by multiple interacting biological, behavioral, and psychosocial factors rather than physical activity alone**.**

Age and Glycemic Control (HbA1c) in Patients with Type 2 Diabetes Mellitus

The univariate analysis showed that most patients with T2DM were aged 19–59 years (67.4%). However, the bivariate analysis indicated no significant association between age and glycemic control, as measured by HbA1c ($p=0.106$; $r=-0.173$). This finding suggests that increasing age was not directly associated with poorer glycemic control in this population. Although aging may be accompanied by metabolic changes and reduced insulin sensitivity, glycemic control is multifactorial and may be more strongly influenced by dietary patterns, physical activity, stress, treatment adherence, family support, and clinical conditions.

This finding is consistent with (Rachmawati, et al., 2022) who reported no significant association between age and HbA1c levels among patients with T2DM in Semarang ($p>0.05$). However, it differs from the findings of (Irfan et al., 2025), who identified a significant association between age and glycemic control among 106 patients with T2DM at Mpunda Community Health Center, Bima City ($p=0.003$; OR=4.950; 95% CI: 1.776–13.796). These differences may be attributable to variations in sample characteristics, age categorization, clinical conditions, study settings, sample size, and statistical methods.

From the perspective of Roy's Adaptation Model, age represents a contextual stimulus that may influence the patient's adaptation to T2DM. Nevertheless, glycemic control reflects an adaptive response resulting from the interaction of multiple stimuli and coping mechanisms rather than age alone. Thus, the absence of a significant association between age and glycemic control in this study suggests that patients' adaptive capacity and other biological, behavioral, and psychosocial factors may play a more important role in determining glycemic outcomes

Most Dominant Factor Associated with Glycemic Control (HbA1c) among Patients with T2DM

The analysis showed that dietary pattern ($p = 0.037$), stress level ($p = 0.039$), and family support ($p = 0.015$) were significantly associated with glycemic control (HbA1c) after controlling for the other variables. The multiple linear regression model was statistically significant, with $F = 4.121$ and $p = 0.002$ ($p < 0.05$), indicating that dietary pattern, stress level, and family support were jointly associated with glycemic control. Family support had the largest standardized beta coefficient ($\beta = -0.250$), identifying it as the most dominant factor associated with glycemic control (HbA1c) among patients with T2DM at Simpang Empat Primary Health Center, Tanah Bumbu. The negative coefficient indicates that better family support tends to be associated with lower HbA1c values and better glycemic control.

(Reynald Susilo et al., 2022), in a study of 186 patients with diabetes participating in the Prolanis program in Manggarai Regency, found that family support was significantly associated with glycemic control ($p = 0.015$). Respondents with controlled HbA1c had higher mean emotional-support scores than respondents with uncontrolled HbA1c. (Zheng et al., 2023) also reported an association between family support and glycemic control among patients with T2DM. Their findings suggest that the quality of family support may help patients maintain self-care behaviors needed to control blood glucose. In the present study, family support was the most dominant factor associated with glycemic control after adjustment for dietary pattern and stress level. From the perspective of Roy Adaptation Theory, family support functions as a contextual stimulus that strengthens the patient's adaptive capacity when facing a chronic disease, thereby promoting an adaptive response in the form of better blood glucose control.

CONCLUSION

The study concluded that most patients with Type 2 Diabetes Mellitus in the working area of Simpang Empat Primary Health Center, Tanah Bumbu Regency, were aged 19–59 years, had a moderate dietary pattern, moderate physical activity, moderate stress levels, and good family support. The most frequently observed HbA1c values were 6.1% and 7.5%. Bivariate analysis showed significant associations between dietary pattern ($p = 0.008$), stress level ($p = 0.043$), and family support ($p = 0.036$) and glycemic control (HbA1c), whereas age ($p = 0.106$) and physical activity ($p = 0.440$) were not significantly associated. Multivariate analysis identified family support as the most dominant factor associated with glycemic control, with the largest standardized beta coefficient ($\beta = -0.250$).

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