International Journal of Health, Economics, and Social Sciences (IJHESS)
Vol. 8, No. 3, 2026, pp. 1866~1871
DOI: 10.56338/ijhess.v8i3.11204
Website: https://jurnal.unismuhpalu.ac.id/index.php/IJHESS

The Effectiveness of Self-Management Education on Reducing Blood Glucose Levels in Patients with Type II Diabetes Mellitus in the Working Area of UPT Puskesmas Paleleh, Buol Regency

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Article Info

Article history:

Received 11 Mar, 2026
Revised 14 May, 2026
Accepted 25 May, 2026

Keywords:

Self-management, Blood Glucose, Type II Diabetes Mellitus

ABSTRACT

Diabetes mellitus can increase mortality rates globally, nationally, and locally, and may cause severe long-term complications if not properly managed. One of the ways to control this problem is through the implementation of diabetes self-management education. The purpose of this study was to determine the effectiveness of self-management education in reducing blood glucose levels among patients with Type II Diabetes Mellitus in the working area of UPT Puskesmas Paleleh, Buol Regency. This study employed a pre-experimental method with a One Group Pretest-Posttest design. The population consisted of 42 respondents, selected using a purposive sampling technique. Data analysis was conducted using the SPSS program with the Wilcoxon Signed-Rank Test, a non-parametric comparative statistical test. The results showed that the effectiveness of diabetes self-management education on reducing blood glucose levels in patients with diabetes mellitus obtained a p-value = 0.000 with alpha < 0.05. Based on the results of the study, it can be concluded that self-management education is effective in reducing blood glucose levels among patients with Type II Diabetes Mellitus in the working area of Puskesmas Paleleh, Buol Regency. This study is expected to serve as a reference for improving health services and to contribute ideas and references for future research.

INTRODUCTION

Diabetes mellitus (DM) is a silent killer disease and one of the greatest global health problems because it is a chronic, life-threatening illness. According to the World Health Organization (WHO, 2023), nearly 80% of diabetes cases are Type II diabetes. Diabetes is one of the leading causes of death worldwide and in the United States. Diabetes is often referred to as the "mother of diseases" because it can trigger various other diseases such as hypertension, cardiovascular disease, kidney failure, stroke, and even blindness. Type II Diabetes Mellitus has become a global health problem today. Indonesia is one of the Southeast Asian countries ranked third with a diabetes prevalence rate of 11.3% (WHO, 2021).

The International Diabetes Federation (IDF) reported that in 2024 there were 588.7 million people with Diabetes Mellitus worldwide, and this number is projected to increase to 852.5 million by 2050. In Indonesia, the number of Diabetes Mellitus patients reached 19.5 million people in 2021 and increased to 20.4 million people in 2024. The increasing incidence of Diabetes Mellitus directly impacts mortality rates, where deaths caused by DM reached 3.4 million worldwide in 2024 (IDF, 2025).

Indonesia is among the countries with the highest number of diabetes sufferers in the world. In 2021, Indonesia ranked fifth with approximately 10.7 million diabetes patients (International Diabetes Federation, 2021). Data from the 2018 Basic Health Research (Riskesdas) showed that the national prevalence of diabetes mellitus based on doctor diagnosis was 2%; however, when measured through blood glucose examination, the prevalence increased to 10.9% (Ministry of Health of the Republic of Indonesia, 2019). Almost all provinces in Indonesia experienced an increase in diabetes mellitus prevalence between 2013 and 2018, except East Nusa Tenggara. Provinces with the highest prevalence during that period were Yogyakarta, DKI Jakarta, North Sulawesi, and East Kalimantan. Meanwhile, provinces with the highest increase in prevalence (0.9%) included Riau, DKI Jakarta,

Banten, Central Sulawesi, and West Papua (Riskesdas, 2018).

At the local level, data from the Buol District Health Office Non-Communicable Disease Control Program showed that in 2024 the prevalence of diabetes mellitus patients reached 9,255 patients, with 5,665 patients (65%) having above-normal blood glucose levels. This condition indicates a serious problem in the self-management of Type II DM patients in Buol Regency.

The PROLANIS Program (Chronic Disease Management Program) at community health centers is a strategic initiative from BPJS Health designed to provide comprehensive management of chronic diseases such as diabetes mellitus. Based on preliminary observations conducted at UPT Puskesmas Paleleh, Buol Regency, it was found that the number of diabetes patients registered in the chronic disease management program from January to September 2025 was 42 people. In the program, structured and continuous education had never been implemented. So far, the chronic disease management program for diabetes mellitus patients has only focused on pharmacological therapy.

Overall, the causes of increasing incidence and mortality of Type II Diabetes Mellitus at the global, national, and local levels are interconnected in a complex causal chain. Research in Indonesia revealed that more than 50% of diabetes mellitus patients have uncontrolled blood glucose levels due to unhealthy eating patterns, lack of physical activity, and inadequate routine blood glucose monitoring (Telli, 2023; Oktoviani & Andriyani, 2022). This condition can lead to serious complications such as cardiovascular disease, stroke, nerve damage, and kidney damage (IDF, 2025).

The management of diabetes mellitus does not solely depend on the role of medical personnel and healthcare workers but also requires active patient involvement. Patient adherence to therapeutic regimens is the main key to achieving controlled blood glucose targets. One of the five pillars of diabetes mellitus management is diabetes self-management education, which complements other elements such as medical therapy, physical activity, foot care, medication adherence, and independent blood glucose monitoring.

Self-management education interventions offer potential as an effective solution to reduce elevated blood glucose levels. Through structured educational programs, patients can improve their understanding of healthy dietary patterns, physical activity, foot care, blood glucose monitoring, and treatment adherence. This approach not only enhances patients' intrinsic motivation but also supports the integration of sustainable healthy habits into daily life. Consequently, diabetes self-management education can reduce the prevalence of hyperglycemia and prevent long-term complications.

Based on the background above, the researcher formulated the research problem: "The Effectiveness of Self-Management Education on Reducing Blood Glucose Levels among Patients with Type II Diabetes Mellitus in the Working Area of UPT Puskesmas Paleleh, Buol Regency."

RESEARCH METHODOLOGY

This study was conducted at UPT Puskesmas Paleleh, Buol Regency, in December 2025. The study used a pre-experimental research design with a One Group Pretest-Posttest design. This design involved measuring the dependent variable (blood glucose levels) before (pretest) and after (posttest) the intervention of diabetes self-management education. The aim was to determine the effectiveness of diabetes self-management education on reducing blood glucose levels in patients with Type II Diabetes Mellitus (Abdullah K., et al., 2022 in Sugiyono, 2016). The sample in this study consisted of 30 diabetes mellitus patients in the working area of UPT Puskesmas Paleleh who met the inclusion criteria.

Data Analysis

Univariate Analysis

Patient demographic data (age, gender, education, duration of suffering from DM, etc.) and initial as well as final blood glucose levels were analyzed using descriptive statistics (frequency distribution, percentage, mean, standard deviation, median, mode, minimum, and maximum) to describe the characteristics of the sample and research variables.

Bivariate Analysis

Before conducting inferential statistical tests, a normality test on blood glucose level data was performed using the Shapiro-Wilk test because the sample size was relatively small (<50).

If the data were normally distributed, the difference in blood glucose levels before and after diabetes self-management education would be analyzed using the Paired t-test.

If the data were not normally distributed, the equivalent non-parametric test, namely the Wilcoxon Signed-Rank Test, would be used.

The significance level (α) was set at 0.05.

RESULTS

Respondent Characteristics

Table 1. Characteristics of Respondents Based on Gender at Puskesmas Paleleh

No.	Gender	Total (n)	Percentage (%)
1	Male	11	36.7
2	Female	19	63.3
Total		**30**	**100**

Source: Primary Data, 2025

Based on Table 1, the results of the study on 30 respondents showed that 11 respondents (36.7%) were male and 19 respondents (63.3%) were female.

Table 2. Analysis of Duration of Suffering from Diabetes Mellitus in the Working Area of Puskesmas Paleleh, Buol Regency

No.	Duration of Illness	Total (n)	Percentage (%)
1	1–5 years	22	73.3
2	6–10 years	8	26.7
Total		**30**	**100**

Source: Primary Data, 2025

Based on Table 2, 22 respondents (73.3%) had suffered from diabetes mellitus for 1–5 years, while 8 respondents (26.7%) had suffered from diabetes mellitus for 6–10 years.

Analysis of Blood Glucose Measurement Results Before and After Diabetes Self-Management Education

Table 3. Results of Blood Glucose Measurements Before and After Diabetes Self-Management Education Intervention in the Working Area of Puskesmas Paleleh, Buol Regency

Blood Glucose Level	Total (n)	Percentage (%)
Before Intervention		
Normal	0	0
High	30	100
After Intervention		
Normal	21	70
High	9	30
Total	**30**	**100**

Based on the results of blood glucose measurements before the implementation of diabetes self-management education, all 30 respondents (100%) with diabetes mellitus had high blood glucose levels. After the education was provided, only 9 respondents (30%) still had high blood glucose levels.

Bivariate Analysis

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Table 4. Results of the Wilcoxon Signed-Rank Test

	N	Mean Rank	Sum of Ranks
After Education – Before Education	Negative Ranks	30	15.50
	Positive Ranks	0	0.00
	Ties	0	
	Total	30	

Wilcoxon Signed-Rank Test (Sig. = 0.000)

Table 4 shows the results of the Wilcoxon Signed-Rank Test from blood glucose examinations before and after the implementation of diabetes self-management education. The data indicate a decrease in the mean rank from 15.50 in the negative ranks to 0.00 in the positive ranks. The significance value obtained was p = 0.000.

DISCUSSION

The Effectiveness of Self-Management Education on Reducing Blood Glucose Levels in Patients with Type II Diabetes Mellitus in the Working Area of UPT Puskesmas Paleleh

Based on the results of the Wilcoxon Signed-Rank Test, all respondents (N = 30) were included in the negative ranks category, with a mean rank value of 15.50 and a sum of ranks value of 465.00, as well as a significance value of $p = 0.000$ ($p < 0.05$). These results indicate that overall there was a decrease in blood glucose levels after diabetes self-management education was provided to all respondents.

In the Wilcoxon Signed-Rank Test, the average difference in blood glucose reduction is not expressed in clinical units (mg/dL), but rather described through the ranking of differences between values before and after the intervention. The mean rank value of 15.50 indicates that the average difference in blood glucose levels after education compared to before education was consistently and evenly reduced among respondents.

The absence of positive ranks and ties indicates that no respondents experienced an increase or no change in blood glucose levels. Therefore, it can be interpreted that all respondents experienced a decrease in blood glucose levels, although the magnitude of clinical reduction (mg/dL) may have varied among individuals.

Statistically, the very small significance value ($p = 0.000$) strengthens the conclusion that the average reduction in blood glucose levels before and after education was significant, meaning that the changes that occurred were not caused by chance, but rather by the impact of diabetes self-management education.

Thus, although the Wilcoxon test does not provide the average reduction value in mg/dL units, the mean rank value of 15.50 can be interpreted as a representation of a consistent average decrease in blood glucose levels among all respondents after receiving education.

The reduction in blood glucose levels after diabetes self-management education occurred because respondents gained a better understanding of how to properly and sustainably manage diabetes. The education provided encouraged respondents to make behavioral health changes, particularly in medication adherence, dietary regulation, and increased physical activity, as well as foot care, blood glucose monitoring, and psychological coping strategies.

Based on interviews with 30 respondents, medication adherence was identified as the most influential factor in reducing blood glucose levels. This is due to the action of antidiabetic medications, which help reduce blood glucose levels by increasing insulin sensitivity or reducing glucose production by the liver. Self-management education helped respondents understand that treatment must be carried out consistently and should not be stopped even when symptoms decrease, resulting in more optimal blood glucose control.

This finding is consistent with research conducted by Andriyani et al. (2025), which showed that before self-management education, the average blood glucose level was 179.06, while after the intervention the average decreased to 139.37. The bivariate test results showed a significance value of 0, indicating a difference in blood glucose levels before and after self-management education. This means that self-management education significantly reduced fasting blood glucose levels in Type II DM patients. The measured blood glucose levels were found to be higher before education than after education, indicating that educational interventions had a positive impact on patient blood glucose levels.

This is also in line with the theory proposed by Suryati et al. (2025), stating that self-care management can influence the stability of patients' blood glucose levels. Poor self-care management results in uncontrolled blood glucose levels, whereas good self-care management leads to controlled blood glucose levels. All aspects of self-care management, including dietary control, medication use, physical activity, stress management, blood glucose monitoring, and routine blood pressure examinations to prevent complications, must be implemented consistently by diabetes mellitus patients to achieve controlled blood glucose levels.

This study is also consistent with the findings of Zai et al. (2019), who conducted research on 30 respondents and found that diabetes self-care management education had an effect on reducing blood glucose levels.

Furthermore, this study aligns with the research conducted by Sampurna (2022), which showed a reduction in patient blood glucose levels from a minimum value of 140 to 120 and a maximum value from 440 to 350, with a p-value of 0.000, which is below the critical value of 0.05. This indicates that diabetes self-management education was effective in reducing blood glucose levels.

From the results and discussion above, it can be concluded that the success of self-management education in reducing blood glucose levels among Type II Diabetes Mellitus patients is influenced by the synergy between medication adherence, dietary regulation, physical activity, foot care, blood glucose monitoring, and psychological coping strategies. These six components complement one another in helping respondents achieve better blood glucose control. Therefore, it can be concluded that diabetes self-management education is effective in reducing blood glucose levels among Type II Diabetes Mellitus patients in the working area of UPT Puskesmas Paleleh, Buol Regency.

CONCLUSION

1. Based on respondent characteristics, the majority of respondents were of productive age (19–59 years), totaling 20 respondents (66.6%), female with 19 respondents (63.3%), high school graduates with 14

respondents (46.7%), and housewives with 13 respondents (43.3%).

2. The results of blood glucose measurements before self-management education showed that all 30 respondents (100%) had high blood glucose levels or random blood glucose levels above 200 mg/dL.
3. The results of blood glucose measurements after self-management education showed that only 9 respondents (30%) still had high blood glucose levels or random blood glucose levels above 200 mg/dL.
4. Based on the results of the study, it was concluded that self-management education was effective in reducing blood glucose levels among Type II Diabetes Mellitus patients in the working area of Puskesmas Paleleh, Buol Regency.

SUGGESTIONS

For the Community Health Center

The results of this study are expected to provide information and data to improve efforts in reducing blood glucose levels among Type II Diabetes Mellitus patients.

For Researchers

This study is expected to contribute ideas and insights to healthcare workers regarding the importance of the role of self-management education in reducing blood glucose levels among Type II Diabetes Mellitus patients.

For Future Research

The researcher hopes that this study can contribute ideas and serve as a reference source in the implementation of diabetes self-management education. Although this study is not yet considered perfect, it is hoped that it can serve as a reference for future studies.

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