The Effect of Diabetes Self-Management Education (DSME) on Changes in Knowledge, Attitude, and Action Among Prolanis Patients with Diabetes Mellitus at East City Primary Health Center

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Abstract— Diabetes mellitus (DM) is a serious chronic disease that will accompany patients for their entire lives if self-management is not controlled, significantly affecting their quality of life. The effectiveness of self-management is influenced by several factors, one of which is the patient's knowledge about managing their condition. Providing education is a crucial pillar in DM management. One form of education that can be used to improve clinical outcomes and quality of life for patients with type 2 DM is Diabetes Self-Management Education (DSME). This study aims to determine the effect of Diabetes Self-Management Education (DSME) on changes in knowledge, attitude, and action among Prolanis patients with DM in the East City Primary Health Care area. The pretest-posttest control group design of this research used a quasi-experimental methodology. The sample consisted of 84 respondents with DM who were part of the Prolanis program at East City Primary Health Care, divided into 42 respondents in the treatment group and 42 respondents in the control group. The samples were chosen using a purposeful sampling method. The instruments used were the DSME booklet and questionnaires. Data were analyzed using the Wilcoxon signed-rank test and Mann-Whitney test. The Wilcoxon test results showed significant differences in knowledge (p = 0.000), attitude (p = 0.000), and action (p = 0.000) before and after the intervention. The Mann-Whitney test results also showed significant differences in knowledge (p = 0.000), attitude (p = 0.000), and action (p = 0.000) between the treatment and control groups. Diabetes Self-Management Education (DSME) has an impact on changes in knowledge, attitude, and action among Prolanis patients with DM in the East City Primary Health Care area. Therefore, DSME intervention can be used as an educational tool for patients with DM and can be integrated into the routine Prolanis program at Primary Health Care centers and non-communicable disease prevention programs.

Keywords— Attitude; Diabetes Self Management Education; Diabetes Melitus; Knowledge; Practice.

I. INTRODUCTION

High blood glucose (or blood sugar) levels are a hallmark of diabetes mellitus, a chronic metabolic illness (World Health Organization, 2023). According to World Health Organization (WHO) data, 422 million people worldwide suffer from Diabetes Mellitus, representing an increase of approximately 8.5% in the adult population. It is estimated that there are 2.2 million deaths attributed to Diabetes Mellitus occurring before the age of 70, particularly in low- and middle-income countries.

Additionally, it is predicted that by 2035, there will be about 600 million people in this group (Kemenkes RI, 2018). The latest data from the International Diabetes Federation (2021) reports that approximately 19.46 million people in Indonesia have diabetes, an increase of 81.8% compared to 2019. This positions Indonesia as the fifth country in the world with the highest number of diabetes cases (International Diabetes Federation, 2021). Findings from the Indonesian Health Survey (SKI) show that all provinces experienced an increase in cases from 2018 to 2023. Gorontalo Province ranked 9th out of 34 provinces with a prevalence rate of 1.7% according to the 2018-2023 SKI results (SKI, 2023).

The incidence of Diabetes Mellitus cases in Gorontalo has been increasing year by year and has become the second most common non-communicable disease in Gorontalo Province. According to the Gorontalo Provincial Health Office profile data, the number of people with Diabetes Mellitus in 2023 in Gorontalo Province was 18,412 individuals. In Gorontalo City, the distribution of Diabetes Mellitus cases has increased over the past two years, from 1,109 cases in 2021 to 2,229 cases in 2023, making Gorontalo City the fourth highest in terms of the number of Diabetes Mellitus cases in Gorontalo Province (Dinas Kesehatan Provinsi Gorontalo, 2023). According to disease registry data from the East City Primary Health Care, Diabetes Mellitus cases ranked third in 2022 with 566 cases and increased to the second most common disease in 2023 with 1,028 cases

The increasing number of diabetes cases in the future will become a heavy burden for healthcare professionals to handle alone. Two-thirds of people with diabetes in Indonesia are unaware that they have the condition, resulting in delayed access to healthcare services, often with complications. Therefore, all parties, including the community and the government, must play an active role in diabetes management efforts (Soelistijo, 2021). Diabetes Mellitus (DM), commonly known as diabetes, is a serious chronic disease. If self-management is not controlled, this condition will accompany patients for their entire lives, significantly affecting their quality of life. The effectiveness of self-management is influenced by several factors, including age, gender, education level, duration

of diabetes, knowledge, self-efficacy, diabetes-related stress, and family support (Ningrum et al., 2019).

The main pillars of type 2 diabetes management according to the 2015 Consensus on Management and Prevention of Type 2 Diabetes in Indonesia are education, medical nutrition therapy, physical exercise, and pharmacological interventions. Providing education is a crucial pillar in diabetes management. One common and effective form of education is Diabetes Self-Management Education (DSME), which has been proven to improve clinical outcomes and quality of life for patients with type 2 diabetes (McGowan, 2018). Research by Khansa (2020) found significant differences in knowledge and physical activity levels before and after DSME education among diabetes patients. A study by Diah Rismayani (2022) showed that DSME programs effectively improved quality of life and all its domains. Additionally, diabetes treatments that are family-based have been shown to improve psychological domains, environmental variables, and quality of life. Based on this background, this study aims to determine the effect of Diabetes Self-Management Education (DSME) on changes in knowledge, attitude, and practice among Prolanis patients with diabetes mellitus at East City Primary Health Care

II. METHOD

This study employed a quasi-experimental design with a pre-test and post-test control group design. The independent variable was Diabetes Self-Management Education (DSME), while the dependent variables were knowledge, attitude, and action among patients with diabetes mellitus in the Prolanis program. The population consisted of patients with diabetes mellitus participating in the Prolanis program at East City Primary Health Care, with a sample of 84 respondents divided into two groups: 42 respondents in the treatment group and 42 respondents in the control group. The samples were chosen using purposive sampling approach. The treatment group received DSME education intervention, which consisted of 4 sessions, each lasting 1-2 hours. In the first meeting, respondents were given a DSME booklet and received DSME education sessions 1 and 2 for 120 minutes. In the second meeting, respondents received DSME education sessions 3 and 4 for 120 minutes. The standard health care services were given to the control group. Before and after the intervention, both groups were measured on their knowledge, attitudes, and actions. The instruments used were the DSME booklet as an educational medium and a questionnaire that had been validated (Sig 2-tailed < 0.05) and proven reliable (Alpha Cronbach > 0.7). The questionnaire evaluated practice, attitude, and knowledge scores. Data were analyzed using the Wilcoxon test to determine differences between pre-test and post-test scores, and the Mann-Whitney test was used to compare the treatment and control groups

III. RESULTS

Table 1 shows that the distribution of respondents' age in the experimental group is highest in the 66-70 year age range, namely 11 people (26.2%) and in the control group in the 46-50 year age range, namely 11 people (26.2%). The distribution of respondents' gender is mostly female, namely 29 people (69.0%) in the experimental group and 26 people (61.9%) in the control group.

TABLE 1. Distribution of Respondents by Age Group, Gender, Education, Occupation, and Duration of Diabetes Mellitus among Prolanis DM Patients

Variable		Frequency	Percentage (%)
Age	Experimental Group:		
	41-45 years	2	4,8
	46-50 years	8	19,0
	51-55 years	3	7,1
	56-60 years	7	16,7
	61-65 years	7	16,7
	66-70 years	11	26,2
	71-75 years	4	9,5
	Control Group :		
	41-45 years	1	2,4
	46-50 years	11	26,2
	51-55 years	8	19,0
	56-60 years	6	14,3
	61-65 years	3	7,1
	66-70 years	7	16,7
	71-75 years	6	14,3
Gender	Experimental Group:		
	Male	13	31,0
	Female	29	69,0
	Control Group:		
	Male	16	38,1
	Female	26	61,9
Education	Experimental Group:		
	Completed Elementary School	5	11,9
	Completed Junior High School	8	19,0
	Completed Senior High School	22	52,4
	Completed Higher Education	7	16,7
	Control Group:		
	Completed Elementary School	3	7,1
	Completed Junior High School	9	21,4
	Completed Senior High School	26	61,9
	Completed Higher Education	4	9,5
Occupation	Experimental Group:		
	Government Employee	2	4,8
	Private Employee	0	0
	Entrepreneur	2	4,8
	Trader	4	9,5
	Others	10	23,8
	Unemployed	24	57,1
	Control Group:		
	Experimental Group:	2	4,8
	Government Employee	1	2,4
	Private Employee	3	7,1
	Entrepreneur	6	14,3
	Trader	6	14,3
	Others		
	Unemployed	24	57,1
Duration of Diabetes Mellitus	Experimental Group :		
	1-5 years	24	57,1
	6-10 years	12	28,6
	11-15 years	6	14,3
	Control Group:		
	1-5 years	26	61,9
	6-10 years	15	35,7
	11-15 years	1	2,4
	Total	42	100

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The distribution of respondents' education level is mostly Senior High School in both the experimental and control groups, namely 22 people (52.4%) in the experimental group and 26 people (61.9%) in the control group. The distribution of occupation in the experimental and control groups shows that the majority of respondents are not working, namely 24 people (57.1%). The distribution of duration of Diabetes Mellitus in the experimental group is 24 people (57.1%) and in the control group is 26 people (61.9%), namely for 1-5 years.

TABLE 2. Wilcoxon Test Results

Group	Wilcoxon Signed-Rank Test	
	Z	Asymp. Sig. (2-tailed)
Experimental Group Knowledge Post-Test - Pre-Test	-5.648[a]	.000
Experimental Group Attitude Post-Test - Pre-Test	-5.674[a]	.000
Experimental Group Action Post-Test - Pre-Test	-5.650[a]	.000

Table 2 shows that there is a difference between the pre-test and post-test results of knowledge, attitude, and action in Prolanis Diabetes Mellitus patients after being given Diabetes Self Management Education (DSME), this can be seen from the Asymp. Sig. (2-tailed) value of the Wilcoxon test on knowledge, attitude, and action, which are all .000, because the p-value = 0.000 is smaller than $p \leq 0.05$ with a calculated Z value of -5.648a for knowledge, -5.674a for attitude, and -5.650a for action. Therefore, it can be concluded that H0 is rejected, which means there is a difference in knowledge, attitude, and action before and after being given the Diabetes Self Management Education (DSME) intervention.

TABLE 3. Mann-Whitney Test Results

Research Group	Mann-Whitney Test	
	Z	Asymp. Sig. (2-tailed)
Experimental-Control Knowledge	-7.691	.000
Experimental-Control Attitude	-7.875	.000
Experimental-Control Action	-8.004	.000

Table 3 shows that the Asymp. Sig. (2-tailed) value of the Mann-Whitney test between the experimental group and the control group is .000 ≤ 0.05, so it can be concluded that there is a significant difference between the control group that was not given Diabetes Self Management Education (DSME) and the experimental group that was given Diabetes Self Management Education (DSME)

IV. DISCUSSION

The Effect of Diabetes Self Management Education (DSME) on Knowledge Changes in Prolanis Diabetes Mellitus Patients

Based on the results of the study on the effect of Diabetes Self Management Education (DSME) on knowledge changes in the experimental group using the Wilcoxon test, a p-value of 0.000 was obtained, which is smaller than $p \leq 0.05$ with a calculated Z value of -5.648a. Therefore, it can be concluded that there is a difference in knowledge among Prolanis Diabetes Mellitus patients before and after being given the DSME

intervention. The results of the Mann-Whitney statistical test showed that the Asymp. Sig. (2-tailed) value of the Mann-Whitney test for knowledge between the experimental and control groups was .000 ≤ 0.05 with a calculated Z value of -7.691. Thus, it can be concluded that there is a significant difference in knowledge between the control group that was not given DSME and the experimental group that was given DSME. This is supported by the study of Murtaqib et al., **(2019)** titled "The Effect of Self Management Education and Supports in Improving The Self-Efficacy Patient with Type 2 Diabetes Mellitus" (p = 0.001), which found that the treatment and control groups had significantly different self-efficacy outcomes before and after receiving DSME, as it increased patients' knowledge of self-care independently compared to just providing knowledge about diabetes mellitus

Diabetes Self Management Education (DSME) facilitates the knowledge and skills of diabetes self-management needed by clients with diabetes in self-care (Funnell, M. M., & Anderson, 2010). DSME provides patients with information about self-care for diabetes. Patients' knowledge, skills, and mental conditions improve, enabling them to manage their disease independently (Marbun et al., 2021). Some components of self-care for diabetes include: dietary management, physical activity/exercise, blood sugar control, medication adherence, and foot care (Hidayah, 2019).

The implementation of DSME in this study consisted of 4 sessions. Sessions 1 and 2 discussed basic knowledge, treatment, monitoring, and nutritional management. Sessions 3 and 4 focused on exercise and physical activity, stress and psychosocial issues, foot care, healthcare systems, and resources. DSME was found to reduce diabetes distress in patients with type 2 diabetes (p = 0.001), as diabetes distress refers to negative psychological reactions related to the emotional burden and concerns of managing a complex chronic disease. Stress in patients with diabetes can worsen their condition. After the study, there was a significant effect of DSME on reducing diabetes distress. Clients who were facilitated with knowledge and skills to perform self-care for diabetes through DSME education, which is a structured and directed health education based on support, can learn how to solve their problems related to diabetes, thereby reducing diabetes-related distress (Nurkamilah et al., 2018).

The Effect of Diabetes Self Management Education (DSME) on Attitude Changes in Prolanis Diabetes Mellitus Patients

Based on the Wilcoxon test on the attitudes of Prolanis Diabetes Mellitus patients who received Diabetes Self Management Education (DSME), the results showed Asymp. Sig. (2-tailed) = 0.000 ≤ 0.05 and a calculated Z value of -5.674, indicating that DSME had a significant impact on attitude changes in patients with diabetes mellitus. The Mann-Whitney statistical test results between the experimental group that received DSME and the control group that did not receive DSME showed a significant difference in attitudes between the two groups, with an Asymp. Sig. (2-tailed) value of .000 ≤ 0.05 and a calculated Z value of -7.875. This study is in line with the research by Avelina et al. (202**2**), which found that DSME had an effect on blood sugar level changes in patients with type II

Diabetes Mellitus in the working area of Nanga Community Health Center, Sikka Regency. Patients can manage their diabetes self-management, which helps reduce blood sugar levels.

Proper diabetes management can alleviate some of the physical and mental consequences of the disease. Symptoms of diabetes can be reduced, and long-term complications can be avoided if blood glucose levels are maintained within a healthy range. Lifestyle modifications, including a healthy diet and regular exercise, are the cornerstone of diabetes management. Self-management refers to an individual's capacity to take charge of their health and reduce the effects of chronic disease. When patients can take charge of their own healthcare while still receiving support from their healthcare team, this is known as self-management (Yusnita et al., 2021). Foot care, medication adherence, physical activity, blood sugar monitoring, and dietary management are some aspects of self-management (Adiatma & Asriyadi, 2020).

According to research conducted by Dewi, (2020), it was found that self-care in patients with diabetic wounds showed a significant improvement, with 80% of patients experiencing improved self-care and 20% experiencing a decline in self-care. The improvement was observed after patients received Diabetes Self-Management Education (DSME). DSME is a diabetes support program that provides patients with diabetes mellitus a platform to receive education, support their development, and maintain healthy behaviors (Asosiasi Diabetes Amerika, 2018).

The Impact of Diabetes Self Management Education (DSME) on Action Changes in Patients with Prolanis Diabetes Mellitus

The results of the Wilcoxon test for post-test and pre-test actions on respondents showed a p-value of 0.000, which is smaller than $p \leq 0.05$ with a calculated Z value of -5.650a. This suggests that Diabetes Self Management Education (DSME) has a significant impact on behavioral changes in patients with diabetes mellitus. The Mann-Whitney statistical test results showed that the Asymp. Sig. (2-tailed) value between the experimental and control groups was $0.000 \leq 0.05$ with a calculated Z value of -8.004, indicating a significant difference in actions between the experimental group that received DSME and the control group that did not receive DSME. This study's findings are consistent with research by Nurjannah, (2022), which found that DSME delivered via WhatsApp during the COVID-19 pandemic had a significant impact on self-care in patients with type 2 diabetes at Seyegan Community Health Center.

Based on these findings, the researcher argues that providing Diabetes Self Management Education (DSME) is highly effective for community health centers (Puskesmas) and can be one of the educational programs in routine Prolanis activities at Puskesmas or in non-communicable disease prevention programs. DSME provides numerous benefits for patients with diabetes mellitus, yielding positive results in the short, medium, and long term. Short-term results include glycemic control (blood sugar and glycosylated hemoglobin), physical control (lipid levels, microalbuminuria, retinopathy, weight, foot ulcers, and blood pressure), lifestyle (smoking habits, diet, physical activity), and mental status (anxiety and depression). Medium-term results include increased knowledge and skills (self-monitoring of blood glucose, medication use, problem-solving), psychological status (coping, behavior, and self-confidence), and utilization of healthcare facilities. Long-term results include prevention of microvascular complications (vision loss, nephropathy, peripheral neuropathy, cerebrovascular disease), reduced mortality, and improved quality of life (Norris et al., 2002). According to Kristanti (2016), during DSME implementation, respondents are provided with an understanding of their disease, enabling them to recognize their condition and manage it effectively. This education empowers respondents to accept their disease and make informed decisions, ultimately improving their quality of life and minimizing the risk of complications

The researcher argues that changes in knowledge, attitudes, and actions were observed in respondents who received Diabetes Self Management Education (DSME) because previously, respondents had not received education about diabetes mellitus. Although the Prolanis program at the community health center provided some education about diabetes, it was not comprehensive. The lack of initiative among patients with diabetes to seek information about their condition also contributed to their limited understanding of the disease. Based on the statistical test results, it can be concluded that DSME significantly improves knowledge, attitudes, and actions in respondents.

V. Conclusions

Diabetes Self Management Education (DSME) has an impact on changes in knowledge, attitudes, and actions in patients with diabetes mellitus in the East City Health Center area. Therefore, DSME intervention can be used as an educational tool for patients with diabetes mellitus and can be integrated into the routine Prolanis program at the Health Center and non-communicable disease prevention programs

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