Implementation of The Five Pillars Diabetes Education on Knowledge and Self-Care Behavior Among Patients With Type 2 Diabetes

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Abstract

Type 2 diabetes mellitus (T2DM) management requires effective self-care, which can be strengthened through structured education. The Five Pillars of Diabetes Self-Care including nutrition, physical activity, medication adherence, blood glucose monitoring, and foot care provide a comprehensive framework for patient with T2DM. This study evaluated the effects of an educational program based on these five pillars on the knowledge and self-care behaviors of patients with T2DM. A quasi-experimental one-group pretest–posttest design was used. A total of 24 patients with T2DM from the Jalan Emas Community Health Center in Tangerang were recruited using accidental sampling. The intervention consisted of four weekly interactive educational sessions that covered all five pillars. Valid and reliable instruments (the Five Pillars Knowledge Questionnaire and the Summary of Diabetes Self-Care Activities/ SDSCA) were used for data collection. Data were analyzed using the Wilcoxon Signed-Rank Test. Post-intervention analysis showed significant improvements in knowledge related to nutrition management (p = 0.023), blood glucose monitoring (p = 0.008), and foot care (p = 0.003). Overall self-care behavior also increased significantly (p = 0.001). However, no significant improvements were observed in knowledge related to physical activity (p = 0.317) and antidiabetic medication (p = 0.053). The Five Pillars Diabetes Education program was effective in improving key areas of knowledge and self-care behavior among patients with T2DM. These findings support the adoption of structured, comprehensive, and practical educational interventions, while also emphasizing the need for more targeted strategies to enhance physical activity engagement and medication adherence.

Keywords: *Diabetes self-care; Diabetes education; Five Pillars of diabetes self-care; Self-care behavior and Type 2 diabetes mellitus.*

I. INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) has become one of the leading public health challenges worldwide due to its continuously increasing prevalence and severe complications that affect patients' quality of life [1]. According to the International Diabetes Federation [2], approximately 537 million people worldwide are living with diabetes and Indonesia ranks fifth globally**,** with an estimated 19.4 million case**s** and over 236,000 diabetes-related deaths each year. At the national level, the 2018 Basic Health Research reported a diabetes prevalence of 1.6% in Banten Province, while in Tangerang Regency**,** the rate reached 1.39%**,** affecting approximately 46,600 people**.** These figures indicate that diabetes remains a serious and growing concern that not only burdens the healthcare system but also reduces the productivity and well-being of affected individuals.Effective diabetes management requires patients to engage in consistent and appropriate self-care practices [3] Health education plays an important role in strengthening patients' knowledge, attitudes, and skills for independent disease management. Education that is well-structured and relevant can empower patients to make informed decisions and take an active role in their care [4].

To support self-care management, the Indonesian Endocrinology Association (PERKENI) developed the Five Pillars of Diabetes Self-Care, which include: (a) dietary management, (b) physical activity, (c) adherence to antidiabetic medication, (d) blood glucose monitoring, and (e) foot care [5]. This approach aligns with Orem's Self-Care Theory, which emphasizes that individuals can maintain their health when provided with adequate information and support [6]. However, in practice, diabetes education in many healthcare settings does not comprehensively address all five pillars. Preliminary study at the Jalan Emas

Community Health Center in Tangerang revealed that patient education primarily focuses on dietary management, physical activity, and medication adherence, with limited emphasis on blood glucose monitoring and foot care. This incomplete approach contributes to gaps in knowledge and self-care behavior among patients with T2DM. Therefore, this study aims to evaluate the implementation of the Five Pillars Diabetes Education and its relationship with patients' knowledge and self-care behavior. The findings are expected to provide evidence-based insights for healthcare professionals in promoting comprehensive diabetes education at the community level.

II. METHODS

This study employed a quasi-experimental design using a one-group pretest–posttest approach. A total of 24 respondents living within the working area of the Jalan Emas Community Health Center in Tangerang participated and completed the diabetes health education program. Participants were selected based on the following inclusion criteria: (a) diagnosed with Type 2 Diabetes Mellitus for more than one year, (b) willing to participate in all educational sessions.

Exclusion criteria included:

(a) patients with severe complications of diabetes such as diabetic ulcers or neuropathy,

(b) patients with hearing or visual impairments,

(c) patients with cognitive or communication disorders, and

(d) those who were unable to complete all educational sessions.

The intervention implemented in this study was a structured diabetes health education program based on the Five Pillars of Diabetes Self-Care developed by the Indonesian Endocrinology Association (PERKENI).

The program aimed to improve participants' knowledge and self-care behaviors related to the five key components of diabetes management:

(a) dietary management,

(b) physical activity,

(c) adherence to antidiabetic medication,

(d) blood glucose monitoring, and (e) foot care.

The intervention was conducted over a four-week period, consisting of four face-to-face educational sessions held once a week. Each session lasted approximately 45–60 minutes and included a combination of **lectures,** demonstrations, and discussions to facilitate participants' understanding and engagement. The sessions covered the following topics:

- Week 1: Introduction to diabetes and dietary management
- Week 2: Physical activity
- Week 3: Blood glucose self-monitoring and anti-diabetic medication management.
- Week 4: Foot care education

All educational sessions were delivered by nursing lecturers from the Faculty of Nursing, Universitas Pelita Harapan, who were trained in diabetes self-management education. The sessions were conducted face to face at the Jalan Emas Community Health Center's education room, with attention to participants' comfort and privacy.Each educational session was designed to be interactive and practical, combining short lectures, discussions, and live demonstrations. The education on nutrition management and foot exercise was further supported through follow-up interactions via a whatsapp group, where participants shared photos or videos of their meal portions and foot exercise practices. Throughout the program, the research team-maintained communication with participants to provide feedback, encouragement, and clarification as needed.To enhance participant engagement, a motivational challenge was organized. Participants who consistently demonstrated correct plate composition and portion control (for nutrition management) and proper foot exercise techniques (for foot care) throughout the four-week program were recognized.

At the final session, one participant from each activity category received a small souvenir as appreciation for their commitment and effort. This approach aimed to foster active participation, strengthen motivation, and support behaviour change beyond the educational sessions.Data collection instruments included the Five-Pillar Diabetes Knowledge Questionnaire *and the* Summary of Diabetes Self-Care Activities (SDSCA) scale. Both instruments were tested for validity and reliability prior to use. The validity test conducted using item–total correlation analysis, yielded correlation coefficients greater than 0.30. Reliability testing using Cronbach's Alpha produced coefficients of 0.87 for the knowledge instrument and 0.81 for the SDSCA. Data were analyzed using the Wilcoxon Signed-Rank Test**.** Data were collected in two stages - pretest and posttest the educational intervention - through questionnaires read aloud by the researcher to ensure comprehension.The study obtained ethical approval from the Health Research Ethics Committee of the Faculty of Nursing, Universitas Pelita Harapan, under approval number 155/KOM-ETIK/FKep/UPH/V/2024.

III. RESULT AND DISCUSSION

Table 1 presents the demographic characteristics of the respondents. The majority of respondents were female (66.7%). The most common age group was 55–65 years **(**12.5%), and the most frequent education level was senior high school (45.8%). Most respondents were unemployed **(**n = 22, 91.8%), and 19 respondents (79.2%) had been diagnosed with diabetes mellitus for less than five years**.**

Table 1. Respondent characteristics (N = 24)

Respondent characteristics	n	Percentage (%)
Sex		
Male	8	33.3
Female	16	66.7
Age		
46-55	4	16.7
56-65	12	50
>65	8	33.3
Educational level		
Elementary	4	16.7
Senior high school	11	45.8
University	9	37.5
Occupation		
Unemployed	22	91.8
Employed	1	8.2
Lama riwayat DM		
<5 tahun	19	79.2
>5 tahun	5	20.8

Table 2. Comparison of respondents' knowledge on the five pillars of diabetes self-care before and after education (N = 24)

Pillar	Category	Pre-Test n (%)	Post-Test (%)
Nutrition management	Good	18 (75.0)	24 (100.0)
	Average	4 (16.7)	0 (0.0)
	Poor	2 (8.3)	0 (0.0)
Physical activity & exercise	Good	16 (66.7)	19 (79.2)
	Average	7 (29.2)	5 (20.8)
	Poor	1 (4.1)	0 (0.0)
Blood glucose monitoring	Good	12 (50.0)	21 (87.5)
	Average	9 (37.5)	3 (12.5)
	Poor	3 (12.5)	0 (0.0)
Antidiabetic treatment	Good	17 (70.8)	21 (87.5)

Pillar	Category	Pre-Test n (%)	Post-Test (%)
	Average	4 (16.7)	3 (12.5)
	Poor	3 (12.5)	0 (0.0)
Foot care	Good	10 (41.7)	19 (79.2)
	Average	9 (37.5)	5 (20.8)
	Poor	5 (20.8)	0 (0.0)

Table 2 shows respondents' knowledge levels across the five pillars of diabetes self-care before and after receiving the educational intervention. Prior to the program, the highest knowledge level was observed in nutrition management (75%) and antidiabetic medication (70.8%), while the lowest was in foot care (41.7%). After the intervention, all respondents (100%) demonstrated good knowledge in nutrition management, and notable improvements were observed in blood glucose monitoring (from 50.0% to 87.5%) and foot care (from 41.7% to 79.2%). These findings indicate that the educational sessions effectively improved participants' understanding across all self-care.

Table 3. Self-Care Behavior Based on the Five Pillars of Diabetes Education Before and After the Intervention (N = 24)

Category	Pre-Test n (%)	Post-Test n (%)
Good	13 (54.2)	24 (100.0)
Poor	11 (45.8)	0 (0.0)

Table 3 shows the respondents' self-care behavior before and after the diabetes education program. Before the intervention, 54.2% of respondents had good self-care behavior, while 45.8% were still poor. After receiving the Five Pillars Diabetes Education**,** all respondents (100%) showed good self-care behavior. This result means that the education program helped participants apply better diabetes management practices in their daily lives.

Table 4. Effect of diabetes education on knowledge and self-care behavior (N = 24)

Aspect Tested	Mean Rank	p-value (Asymp. Sig 2-tailed)
Nutrition management	3.50	0.023
Physical activity & exercise	7.31	0.317
Blood glucose monitoring	6.15	0.008
Antidiabetic treatment	4.17	0.053
Foot care	7.13	0.003
Self-care behavior (five pillars)	6.00	0.001

Table 4 shows the results of the Wilcoxon Signed-Rank Test on the effect of the Five Pillars Diabetes Education on respondents' knowledge and self-care behaviour. The results indicate that there were significant differences between pre-test and post-test scores in several areas of diabetes self-care.Significant improvements were found in nutrition management ($p = 0.023$), blood glucose monitoring ($p = 0.008$), and foot care ($p = 0.003$). This means that the education sessions successfully increased participants' knowledge in these areas, especially in aspects that were less emphasized before. Meanwhile, no significant changes were observed in physical activity ($p = 0.317$) and antidiabetic treatment ($p = 0.053$), even though some improvement was seen. A significant increase was also found in overall self-care behavior ($p = 0.001$), showing that the Five Pillars Diabetes Education program helped participants apply better diabetes self-care practices in their daily lives.

Discussion

This study implemented a comprehensive educational intervention based on the Five Pillars of Diabetes Self-Care, which aimed to improve both knowledge and self-care behavior among patients with Type 2 Diabetes Mellitus. The findings showed significant improvements in participants' knowledge regarding nutrition management, blood glucose monitoring, and foot care, as well as an overall enhancement in self-care behavior. These results indicate that structured and comprehensive diabetes education can effectively strengthen patients' understanding and daily self-management practices.The difference between the five-pillar educational approach in this study and that of other articles lies in its more practical and

structured delivery of material, which comprehensively covers all pillars. This distinguishes the present study from previous ones that tended to focus on only two or three aspects of self-care. For example, several studies emphasized increasing knowledge and behavior related to dietary management and physical activity, without integrating aspects of foot care or independent blood glucose monitoring [7];[8];[9]. Despite its importance in preventing ulceration and lower-extremity complications, the foot care component of diabetes self-management is frequently overlooked in both research and patient education programs.

This study also employed a simulation-based approach, including diabetes exercise demonstrations, food label reading practice, and self-monitoring of blood glucose, which have not been widely implemented in other studies. Weise et al [10] (2024), in a national study, found that many participants in diabetes education programs felt that the education they received was passive and lacked practical skills training that could be applied in daily life. This finding suggests that experiential educational approaches, such as those used in this study, can have a greater impact on knowledge internalization and the development of long-term healthy behaviors. Additionally, this approach incorporates local cultural elements and is specifically designed to meet the needs of the local community, as suggested by Rahman et al [11] (2024), who emphasized the importance of community-based contextual education. Therefore, the five-pillar approach in this study can be considered a development of previous educational models that is more comprehensive and holistic.

Despite the overall improvement, the findings indicate that there was no significant improvement in physical activity and antidiabetic treatment. This phenomenon can be explained by several inhibiting factors. Internal barriers such as physical limitations, advanced age, and negative perceptions of physical activity may reduce motivation to engage in regular exercise. In addition, limited facilities present obstacles to maintaining consistent physical activity. The absence of a significant improvement in the antidiabetic treatment aspect may be attributed to the already high level of compliance prior to the intervention, leaving little room for further behavioural change. Furthermore, various external constraints, including limited access to healthcare facilities, inflexible visit schedules, and the financial burden of treatment, may also have contributed to the lack of improvement in this pillar.These findings are consistent with the studies conducted by Hailu et al[12] (2019), Rahman et al [11] (2023), and Wichit et al [13] (2017), which state that the effectiveness of diabetes self-care education largely depends on social context, individual abilities, delivery methods, and environmental support. Therefore, a more individualized, participatory, and sustainable educational approach is needed to optimize the impact across all aspects of the five pillars of self-care.

IV. CONCLUSION

This study found that implementing the Five Pillars Diabetes Education significantly improved participants' knowledge in three areas—nutrition management, blood glucose monitoring, and foot care—and led to overall improvement in self-care behaviour among patients with Type 2 Diabetes Mellitus. These findings demonstrate that structured and comprehensive education effectively enhances understanding and supports behavioral change in diabetes management. However, no significant improvement was observed in physical activity and antidiabetic medication knowledge, indicating the need for more adaptive and contextual strategies to address barriers such as physical limitations, motivation, and prior adherence patterns. Overall, this study demonstrates that the Five Pillars Diabetes Education Model and the implementation of supportive interventions for each pillar is an effective model for empowering patients in the self-management of diabetes. Nurses play a key role in maintaining this approach, while future programs should integrate community-based and culturally tailored interventions to encourage long-term behavioral change and improve quality of life for people with diabetes.

V. RECOMMENDATIONS

Based on the findings of this study, the Five Pillars Diabetes Health Education Program has been proven to improve the knowledge and self-care behavior of patients with diabetes mellitus, although not evenly across all aspects. The results of this insignificant physical activity need to be observed and further motivated, as one of the interventions for normal blood sugar control is physical activity. The Jalan Emas Community Health Center itself already has a Prolanis program for service activities and exercises for adults

and seniors, especially those with diabetes. Therefore, it is recommended that future educational interventions adopt more interactive and adaptive methods that are appropriate to the socio-cultural context of the participants. A combination of lectures, demonstrations, audio-visual media, group discussions, and experience-based learning based on patient stories or real experiences is expected to increase participant engagement, understanding, and ability to apply self-care practices in their daily lives.

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