

Original Article

Changes in self-care following a family-based care intervention among patients with type 2 diabetes mellitus: A one-group pretest–posttest study

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Abstract

Background: Self-care is a fundamental component of diabetes management; however, many patients with type 2 diabetes mellitus demonstrate inadequate self-care practices. Family support plays an important role in promoting adherence to medication, dietary management, physical activity, blood glucose monitoring, and foot care, thereby supporting diabetes self-management.

Objective: This study aimed to evaluate changes in self-care following a family-based care intervention among patients with type 2 diabetes mellitus.

Methods: A quantitative pre-experimental study using a one-group pretest–posttest design was conducted among 30 patients with type 2 diabetes mellitus recruited through purposive sampling at Mijen Primary Health Center, Semarang, Indonesia. Participants received a two-week family-based care intervention consisting of structured family education during the first week and family monitoring during the second week. Self-care was assessed before the intervention and immediately after the intervention using the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. Data were analyzed using the Wilcoxon signed-rank test.

Results: Most participants were aged 56–65 years (53.3%), female (56.7%), and had completed elementary school education (40.0%). Before the intervention, most participants were categorized as having fair self-care (53.3%), whereas after the intervention, most were categorized as having good self-care (63.3%). Wilcoxon signed-rank test showed a statistically significant difference between pretest and posttest self-care scores ($Z = -4.963$, $p < 0.001$).

Conclusion: Participants demonstrated higher self-care scores following the family-based care intervention than before the intervention. These findings provide preliminary evidence that involving family members may support self-care among patients with type 2 diabetes mellitus in primary healthcare settings. Further controlled studies with larger samples and longer follow-up periods are needed to confirm the effectiveness of this intervention.

Background

Diabetes mellitus has become one of the most significant global public health challenges due to its increasing prevalence and substantial burden on healthcare systems. According to the International Diabetes Federation (IDF) Diabetes Atlas 10th Edition, approximately 537 million adults aged 20–79 years were living with diabetes worldwide in 2021, and this number is projected to increase to 643 million by 2030 and 783 million by 2045 (Magliano et al., 2021). Indonesia ranks among the countries with the highest number of people living with diabetes, with an estimated 19.5 million cases in 2021, placing the country fifth worldwide. Data from the Indonesian Health Survey (SKI) 2023 further reported that diabetes remains one of the leading non-communicable diseases, with a national prevalence of 11.7%, highlighting the growing burden of diabetes in Indonesia (Kementerian Kesehatan RI, 2023). In Semarang City, 5,991 diabetes cases were reported

in 2023, predominantly among adults aged 46–65 years, indicating that diabetes continues to be a major public health concern at the regional level.

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from impaired insulin secretion, insulin action, or both. Poor glycemic control may lead to various microvascular complications, including neuropathy, nephropathy, and retinopathy, as well as macrovascular complications such as cardiovascular disease, peripheral vascular disease, and stroke (Cita et al., 2019; Rif'at et al., 2023). Preventing these complications requires comprehensive diabetes management, in which self-care is considered one of the fundamental components.

Self-care refers to the daily activities performed by individuals to manage their illness, maintain health, and prevent complications. In patients with type 2 diabetes mellitus, self-care encompasses medication adherence, healthy

eating, physical activity, blood glucose monitoring, and regular foot care. Previous studies have demonstrated that inadequate self-care remains common among patients with diabetes. Dentaningtyas and Silvitasari (2024), for example, reported that 52.5% of participants enrolled in a Prolanis program exhibited poor self-care behaviors. Suboptimal self-care may contribute to poor glycemic control, increased risk of complications, and greater utilization of healthcare services, emphasizing the importance of identifying effective strategies to strengthen diabetes self-management.

Among the factors influencing diabetes self-care, family support has consistently been identified as one of the most important determinants. Family members provide emotional, informational, and instrumental support that may encourage patients to adhere to treatment recommendations and maintain healthy behaviors (Kandel & Wichaidit, 2021; Ramadhani et al., 2024). Family-based care adopts a collaborative approach that actively involves family members throughout the care process, recognizing the family as an integral partner in supporting patients' long-term disease management. The core principles of family-centered care include dignity and respect, information sharing, participation, and collaboration between healthcare providers, patients, and their families (Patricia, 2016). Through these mechanisms, family involvement may facilitate medication adherence, dietary management, physical activity, blood glucose monitoring, and foot care.

Previous studies have consistently reported beneficial outcomes of family-based interventions for diabetes management. Yuliana and Junaidin (2021) demonstrated that family-based diabetes self-management education was associated with improvements in self-care, glycemic control, and quality of life. Likewise, Sholikhah et al. (2021) reported improvements in self-care and self-efficacy following family-based diabetes self-management education. Collectively, these findings suggest that involving family members may support diabetes self-management. However, most previous interventions primarily focused on educational sessions delivered within structured diabetes self-management education programs, with limited emphasis on continuous family engagement after education was completed.

In addition, evidence regarding family-based care that combines structured education, active family participation, and systematic family monitoring within primary healthcare settings remains

limited. Continuous family monitoring may reinforce educational messages, identify barriers to self-care, and encourage sustained adherence to recommended diabetes management behaviors. Nevertheless, few studies have evaluated this integrated approach in community-based primary healthcare services.

Preliminary observations conducted at Mijen Primary Health Center, Semarang, in January 2025 showed that 1,391 patients with diabetes mellitus were registered in 2024, including 170 new cases reported in December 2024. Interviews with ten patients further revealed that six participants (60%) demonstrated poor self-care behaviors, indicating that diabetes self-management remains a challenge in this setting.

Considering the limited evidence regarding family-based care integrating structured education with continuous family monitoring in primary healthcare, this study was conducted to evaluate changes in self-care following a family-based care intervention among patients with type 2 diabetes mellitus using a one-group pretest-posttest design.

Methods

Study Design

This study employed a quantitative pre-experimental design using a one-group pretest-posttest approach to evaluate the effectiveness of family-based care in improving self-care among patients with type 2 diabetes mellitus. This design was selected because it allows the evaluation of changes in self-care before and after the intervention within the same group of participants and was considered appropriate as a preliminary intervention study to assess the initial effectiveness of family-based care in the primary healthcare setting before conducting larger controlled studies. The study was conducted at Mijen Primary Health Center, Semarang, Indonesia, from April 8 to April 30, 2025.

Sampling

Participants were recruited using purposive sampling from patients with type 2 diabetes mellitus who attended the diabetes management program at Mijen Primary Health Center during the study period. The inclusion criteria were: (1) diagnosed with type 2 diabetes mellitus by a physician; (2) aged 18 years or older; (3) living with at least one family member who was willing to participate in the intervention; (4) able to

communicate verbally; and (5) willing to participate by signing written informed consent. Patients with severe cognitive impairment, serious medical conditions requiring hospitalization, or those who were unable to complete the intervention were excluded.

The minimum sample size was determined based on the recommendation for preliminary pre-experimental studies, which suggests a minimum of 30 participants to provide adequate statistical power for within-group comparisons. During the recruitment process, 38 patients were assessed for eligibility. Of these, 8 patients were excluded because they did not meet the inclusion criteria or declined participation. Finally, 30 participants completed both the intervention and post-intervention assessment and were included in the final analysis.

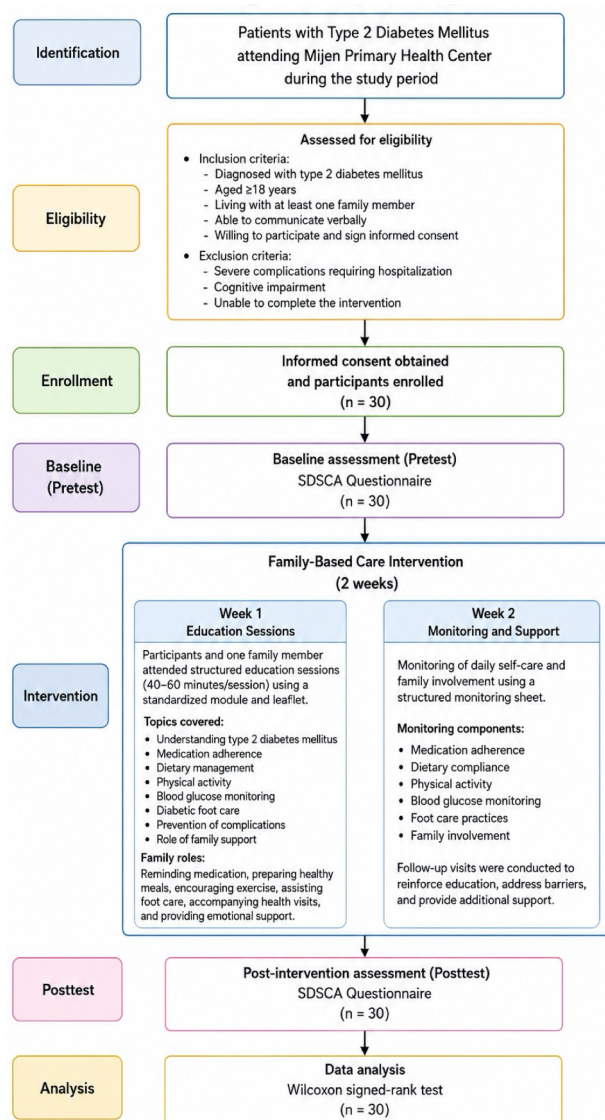


Figure 1. Study Flow Diagram

Instruments

Self-care behavior was measured using the Indonesian version of the Summary of Diabetes Self-Care Activities (SDSCA) questionnaire. The SDSCA used in this study consisted of 11 items representing six domains of diabetes self-care, namely general diet, specific diet, physical activity, blood glucose monitoring, foot care, and medication adherence. The smoking item included in the original SDSCA was recorded separately and was not included in the calculation of the overall self-care score because it was applicable only to respondents who smoked.

Each item was scored according to the number of days (0–7 days) respondents performed the recommended self-care behaviors during the previous seven days. Domain scores were calculated by averaging the item scores within each domain, while the overall self-care score was calculated by summing the domain scores. Higher scores indicated better self-care behavior. The Indonesian version of the SDSCA demonstrated acceptable validity ($r > 0.33$) and reliability (Cronbach's $\alpha = 0.656$) (Nurjannah, 2022).

Intervention

The family-based care intervention was developed based on the principles of Family-Centered Care and Family Systems Theory, emphasizing active family participation in supporting diabetes self-management. The intervention was implemented over two consecutive weeks and delivered by the principal investigator.

Prior to implementation, the educational module and family monitoring sheet were developed based on current diabetes management guidelines and the principles of Family-Centered Care. The educational module underwent content validation by two experts, consisting of a community nursing expert and a medical-surgical nursing expert. The experts evaluated the relevance, clarity, comprehensiveness, and appropriateness of the educational content to ensure its suitability for patients with type 2 diabetes mellitus and their family members. The module was subsequently revised according to the experts' recommendations before being implemented in the study.

During the first week, each participant attended one individual structured educational session together with one family member. The session

lasted approximately 40–60 minutes and was conducted at the participant's home using a standardized family-based care module supported by educational leaflets. The educational content included an overview of type 2 diabetes mellitus, medication adherence, healthy dietary management, physical activity, blood glucose monitoring, diabetic foot care, prevention of diabetes-related complications, and the role of family members in supporting patients' self-care.

Family members were encouraged to actively remind patients to take medications as prescribed, prepare appropriate meals according to dietary recommendations, encourage regular physical activity, assist with daily foot care, accompany patients to routine healthcare visits, and provide emotional and motivational support.

During the second week, participants and their family members implemented a structured family monitoring program using a family monitoring sheet. Monitoring focused on medication adherence, dietary compliance, physical activity, blood glucose monitoring, foot care practices, and family involvement in supporting daily self-care activities. The principal investigator conducted one follow-up home visit to review the monitoring records, reinforce the educational messages, identify barriers to self-care, and provide additional guidance and support whenever necessary.

Data Collection

Data collection was conducted using a door-to-door approach between April 8 and April 30, 2025. Before the intervention, respondents completed the SDSCA questionnaire as a baseline (pretest) assessment to evaluate their self-care practices during the previous seven days.

Following completion of the two-week family-based care intervention, respondents completed the same questionnaire on Day 12 as the posttest to evaluate changes in self-care behavior after the intervention.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 22. Descriptive statistics were used to

summarize respondents' demographic characteristics and self-care categories using frequencies and percentages.

The normality of the data was examined using the Shapiro–Wilk test, which indicated that the self-care scores were not normally distributed ($p < 0.05$). Therefore, differences in self-care scores before and after the intervention were analyzed using the Wilcoxon signed-rank test. Statistical significance was established at $p < 0.05$.

Ethical Consideration

Ethical approval for this study was obtained from the Health Research Ethics Committee of Telogorejo University, Semarang, Indonesia (Approval No. 013/III/EC/P3M/STIKES/2025). Prior to participation, all respondents received a complete explanation regarding the study objectives, procedures, potential benefits, and possible risks. Written informed consent was obtained from each participant before data collection commenced. Participants were assured that their participation was voluntary, confidentiality would be maintained, anonymity would be protected, and they could withdraw from the study at any time without any consequences.

Results

A total of 30 participants completed the family-based care intervention and were included in the final analysis. The results are presented in three sections: participants' demographic and clinical characteristics, self-care categories before and after the intervention, and changes in self-care scores based on the Wilcoxon signed-rank test.

Based on Table 1, it can be concluded that of the 30 respondents, the majority were in the late elderly age category, the majority were female, the majority had elementary school as their last level of education, the majority were housewives, and the majority had suffered from type 2 diabetes for ≥ 5 years. The self-care of type 2 diabetes patients before being given family-based care interventions was mostly in the fairly good self-care category, and the majority of respondents were in the good self-care category after being given family-based care interventions.

Table 1. Characteristic of participants

Characteristic	f	%
Age		
Early elderly (46-55)	7	23,3
Late elderly (56-65)	16	53,3
Elderly (>65)	7	23,3
Sex		
Male	13	43,3
Female	17	56,7
Education		
Elementary School	12	40,0
Junior High School	4	13,3
Senior High School	8	26,7
Collage	4	13,3
No School	2	6,7
Occupation		
Housewife	14	46,7
Private employee	4	13,3
Entrepreneur	6	20,0
Others	6	20,0
Duration of Type 2 Diabetes		
<5 years	10	33,3
≥5 years	20	66,7
Pre-test Self-care		
Poor self-care	14	46,7
Fair self-care	16	53,3
Post-test Self-care		
Fair self-care	11	36,7
Good self-care	19	63,3

Table 2. The Effect of Family-Based Care on Respondents' Self-Care

		n	Mean Rank	Z	P-Value
Pre-Post	Negative Ranks	0	0,00	-4,963	0,001
	Positive Ranks	28	14,50		
	Ties	2			

Based on Table 2, the results of the Wilcoxon test analysis show that the negative rank value of 0 means that there was no decrease in self-care after the family-based care intervention was given. The positive rank value of 28 means that there was an increase in self-care after the family-based care intervention was given. Meanwhile, 2 respondents did not experience an increase in self-care. The p-value is 0.001. Since 0.001 is less than 0.05, it can be concluded that "Ha is accepted." This means that family-based care has an effect on the self-care of patients with type 2 diabetes mellitus.

Discussion

The present study found that participants demonstrated higher self-care scores following the family-based care intervention compared with their baseline assessment. Although the study

design does not allow causal conclusions, these findings suggest that involving family members in diabetes management may support improvements in self-care behaviors among patients with type 2 diabetes mellitus. The observed changes may be related to the active participation of family members throughout the intervention period. Family members not only attended educational sessions together with the participants but also participated in monitoring and reinforcing daily self-care practices. Such continuous support may have encouraged adherence to medication, dietary recommendations, physical activity, blood glucose monitoring, and foot care.

The combination of structured family education and home-based monitoring may have contributed to the observed changes in self-care behaviors. Educational sessions provided

participants and their family members with knowledge regarding diabetes management, whereas the family monitoring sheet encouraged the application of recommended self-care practices in daily life. Continuous monitoring also provided opportunities for family members to identify barriers to self-care, offer reminders, and provide encouragement, which may have facilitated adherence to recommended diabetes self-management behaviors.

These findings can be interpreted using Family Systems Theory, which proposes that health-related behaviors are influenced by interactions among family members. Within the context of diabetes management, family members provide emotional, informational, and instrumental support. Emotional support may help patients maintain motivation to perform self-care activities, informational support may improve understanding of diabetes management, while instrumental support includes assistance with medication management, meal preparation, transportation to healthcare facilities, and supervision of foot care. Together, these forms of support may create a home environment that encourages the adoption and maintenance of recommended self-care behaviors.

The findings are also consistent with Friedman's Family Nursing Theory, which emphasizes the family's role in recognizing health problems, making health-related decisions, providing direct care, modifying the home environment, and utilizing healthcare services. During the intervention, family members actively reminded participants to take medications, prepared meals according to dietary recommendations, encouraged regular physical activity, supervised foot care, and accompanied participants during routine healthcare visits. These activities may have strengthened participants' confidence and adherence to recommended self-care practices.

The present findings are consistent with previous studies by Ramadhani et al. (2024), Sholikhah et al. (2021), and Mayberry et al. (2021), which reported positive associations between family involvement and diabetes self-management behaviors. However, unlike previous studies that primarily evaluated family-based diabetes self-management education, the present study incorporated structured education together with continuous family monitoring within a primary

healthcare setting. Although direct comparisons should be interpreted cautiously because of differences in study design and intervention characteristics, the observed findings suggest that combining family education with ongoing family involvement may be a feasible approach for supporting diabetes self-care in primary healthcare settings.

Despite the observed increase in self-care scores, two participants did not experience changes in their self-care category, although their individual scores increased. This finding suggests that family support alone may not fully explain changes in self-care behavior. Other factors, including educational level, duration of diabetes, health literacy, self-efficacy, personal motivation, and diabetes-related complications, may also influence patients' ability to perform self-care activities. Therefore, future studies employing controlled study designs, larger sample sizes, and longer follow-up periods are needed to further evaluate the role of family-based care in supporting diabetes self-management.

Conclusion and Recommendation

This study showed that participants had higher self-care scores after receiving the family-based care intervention than before the intervention. These findings provide preliminary evidence that involving family members may support self-care among patients with type 2 diabetes mellitus in primary healthcare settings. However, because this study used a one-group pretest-posttest design without a control group, causal inferences cannot be drawn. Further studies using controlled designs, larger sample sizes, and longer follow-up periods are needed to confirm the potential contribution of family-based care to diabetes self-management.

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Declaration of conflict of interest

The authors declare no competing interests.

Declaration on the Use of AI

No AI tools were used in the preparation of this manuscript.

Data Availability Statement

Data sharing is not applicable to this article.

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