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ORIGINAL ARTICLE

EFFECT OF THE FAMILY CAREGIVER EMPOWERMENT MODEL INTERVENTION ON THE SELF-EFFICACY OF PEOPLE WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Low family support in diabetes management can decrease the self-efficacy of people with type 2 diabetes mellitus (T2DM), impacting diabetes management and outcomes. Healthcare providers can use the family caregiver empowerment model (FCEM) intervention to empower families as caregivers. The study aimed to analyze the effect of the FCEM intervention on people with T2DM self-efficacy. The randomized control trial study was conducted with 85 respondents (intervention group = 41; control group = 44), randomly selected using cluster random sampling. The intervention group received an empowering intervention based on the FCEM model, while the control group received standard care. Sociodemographic and diabetes self-efficacy questionnaires were used to collect the data. Data were analyzed using the dependent t-test and Mann-Whitney U test. The results showed a significant difference in self-efficacy in both groups before and after the intervention (p = 0.001). There was also a significant difference between the intervention and control groups (p = 0.001). The FCEM interventions had a positive effect on the self-efficacy of the people with T2DM. Therefore, healthcare providers can use the FCEM intervention to enhance the family's role in diabetes management and increase the self-efficacy of people with T2DM, improving diabetes self-management and outcomes.

Keywords: *Empowerment; family caregiver; self-efficacy; type 2 diabetes mellitus*

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BACKGROUND

Type 2 diabetes mellitus (T2DM) management should be integrated to obtain optimal outcomes. In addition to medical management, people with T2DM must also perform continuous daily self-management. Good cooperation is needed among healthcare providers, families, and patients to achieve optimal outcomes, minimize risks of complications, and improve quality of life (American Diabetes Association, 2021; International Diabetes Federation, 2021).

Other than physical factors, psychological aspects, such as emotional and behavioral characteristics, also contribute to worsening T2DM (American Diabetes Association, 2022). Several studies stated that anxiety disorder, depression, low self-efficacy, and poor self-care behavior could lead to uncontrolled blood sugar levels (hypo or hyperglycemic), which can cause acute and or chronic complications (Gurmu et al., 2018; Hurst et al., 2021; Kong & Cho, 2020; Kuang et al., 2021). Moreover, diabetes causes an individual to lose life's joy and experience psychological problems. They may feel worried about the condition of their disease and lose self-efficacy, which will gradually result in a loss of self-confidence and a feeling of hopelessness (Akturk & Aydinalp, 2018; Kuang et al., 2021). A low level of self-efficacy will cause a person to be unable to solve their problems. This problematic psychological condition can cause a decline in the physical condition and worsening outcomes (Akturk & Aydinalp, 2018; Gurmu et al., 2018; Kong & Cho, 2020).

By 2045, the total number of people with diabetes mellitus could reach 783 million worldwide, of which 80-90% are T2DM. In 2021, the prevalence of T2DM in Indonesia was 19.5 million people, estimated to be 28.6 million in 2045 (International Diabetes Federation, 2021). In East Java

Province, in 2018, there was an increase of 2.6% in diabetes prevalence compared to the 2.1% increase in 2013 (Ministry of Health Indonesia, 2019). In Jember regency, the rise in prevalence was 2%, higher than the 1.1% increase in 2013. As of 2020, there were 35,951 people with T2DM in Jember (Jember Regency Health Office, 2022).

Furthermore, a previous study showed that 47.5% of people with T2DM had poor self-efficacy (Oluma et al., 2020). Self-efficacy skills can help patients fully commit to the care and treatment process (Dehghan et al., 2017). Low self-efficacy requires patients and their caregivers to put in effort to increase efficacy through various sources. Self-efficacy sources include personal and vicarious experiences, verbal persuasion, and physical and emotional conditions (Bandura, 2018). Diabetes self-efficacy focuses on beliefs about their ability to plan, manage, and modify behavior to achieve blood glucose level control and good quality of life (Amer et al., 2018; Clara et al., 2021; Oluma et al., 2020).

Success in managing T2DM, apart from depending on involving people with T2DM in the self-care process, also relies on the family's role (Abedini et al., 2020; Chan et al., 2020). Diabetes intervention with family involvement can also form new role structures in the family to ensure optimal self-management (Abedini et al., 2020; Chan et al., 2020; Matrook et al., 2018). Family caregivers' empowerment impacts the sustainability of the T2DM family member's physical, mental, and emotional stability, increases their self-confidence in providing care, improves patient-family relationships and self-development, and supports sustainable social activities (Matrook et al., 2018; Sakanashi & Fujita, 2017). Family empowerment in T2DM management optimizes diabetes self-care and outcomes (Diriba et al., 2023; Matrook et al., 2018). Previous studies revealed that family empowerment can improve the self-efficacy of people with T2DM (Al Mahdi et al., 2020; Parvareshan et al., 2017).

FCEM differs from other diabetes education models as it specifically intends to empower family members who act as caregivers in T2DM self-management. This model focuses on strengthening filial values (responsibility, respect, and care) from family caregivers. Strengthening filial values can increase family caregiver empowerment through four stages: reducing the health worker dominance, increasing participation of family caregivers, reducing the challenges family caregivers face in patient care, and increasing collaboration between family caregivers and health workers. Empowerment can improve the family caregivers' abilities to perform T2DM self-care, impacting the health status of people with T2DM (Rondhianto et al. 2020, 2022).

In addition, this FCEM intervention has different intervention materials and procedures than other models. The FCEM intervention material is arranged more comprehensively than other models, as it includes the concept of disease management within the family, situational factors, the role of nurses, filial values, and empowerment of family caregivers in the self-management of T2DM. The intervention comprises three stages (education, training, and mentoring), spread over 10 sessions in 10 weeks. Education and training sessions are conducted individually with contextual and adult learning strategies to accommodate family caregivers as adults with specific needs. They are adjusted to the context of the problems faced. Mentoring comprises monitoring and evaluating the implementation of the prepared self-management plan and providing support for access to the resources needed to ensure the quality of T2DM self-management according to available abilities and resources. The FCEM intervention also emphasizes the direct involvement of family caregivers in the self-management of diabetes by providing knowledge, technical skills, and managerial skills in diabetes care (Rondhianto et al., 2022). Direct and active family involvement in diabetes management can reduce negative emotions and the burden of disease management, thereby increasing self-awareness, self-confidence, and self-control, resulting in self-efficacy of people with T2DM in managing the disease (Matrook et al., 2018; Sakanashi & Fujita, 2017). Therefore, this study aims to analyze the effect of FCEM intervention on self-efficacy in people with T2DM.

METHOD

Study Design

The study used a randomized controlled group with a pre-test and post-test design**.**

Sample

This study comprises family members who act as caregivers and people with T2DM in the Banjarsengon Public Health Center (PHC), Jember Regency. The following conditions were the inclusion criteria for family caregivers: (1) husband/wife/adult child of people with T2DM, (2) live in the same house with the person with T2DM, (3) have a telephone, (4) does not have any physical, mental, or cognitive limitations (blindness, deafness, mutism, anxiety disorders, depression, dementia, and more), and (5) have health insurance. Meanwhile, the following conditions are the inclusion criteria for people with T2DM: (1) diagnosed with diabetes for more than one year, (2) not having severe complications (such as heart disease, chronic kidney disease, and more), (3) not being hospitalized in a health facility, and (4) not having communication difficulties.

The sample size was calculated using the G*Power software ($\alpha = 0.05$, $\beta = 0.80$, and $f^2 = 0.64$). Effect size (f^2) was taken from a previous study (Sousa et al., 2021). The minimum number of samples is 40 in each group. Thus, the total minimum number of samples is 80 people. However, to anticipate some respondents dropping out of the study, the researchers selected 90 respondents using the cluster random sampling technique (Figure 1). The population of people with T2DM in Banjarsengon PHC was 308, spread across five villages (Banjarsengon, Baratan, Bintoro, Jumerto, and Slawu). As many as 300 people met the study criteria, but only 214 agreed to participate. The researcher then calculated the sample size with the fraction cluster sampling formula to determine the sample size for each village: (1) Banjarsengon = 28/214 x 90 = 11.77 = 12 respondents, Baratan = 58/214x 90 = 24.39 = 24 respondents, Bintoro = 53/214 x 90 = 22.29 = 22 respondents, Jumerto = 14/214 x 90 = 5.89 = 6 respondents, and Slawu = 61/214x 90 = 25.65 = 26 respondents.

Using single-blind randomization, the researcher randomly divided the respondents into two groups (intervention and control group) proportionally; each group had 45 respondents. During the research process, five respondents dropped out. In the intervention group, one person was ill, and three people were busy or unreachable, so they did not receive the entire intervention. In the control group, one person dropped out because the respondent died. Thus, at the end of the study, only 85 respondents remained, comprising 41 people (intervention group) and 44 people (control group).

Instrument

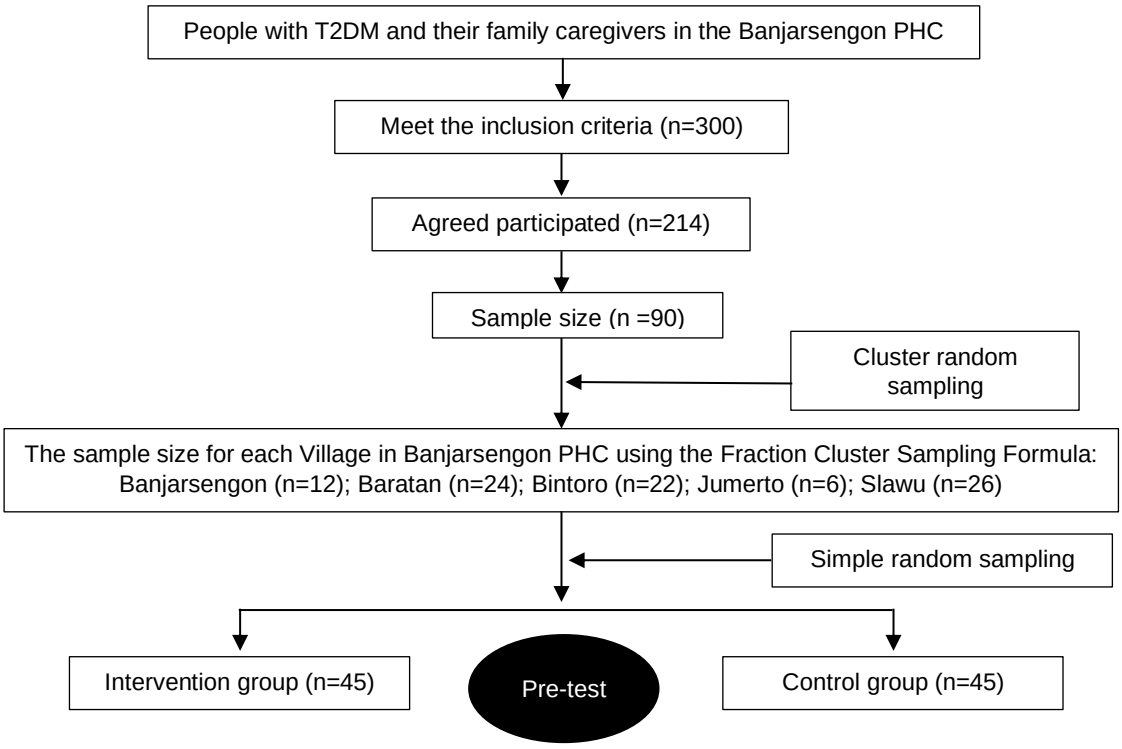
The instruments used in the data collection were questionnaires. The sociodemographic questionnaire was used to assess the sociodemographic conditions of family caregivers, including age, gender, education level, income level, marital status, and kinship. It was also used to assess the sociodemographic conditions of people with T2DM, including age, gender, education level, income level, employment, marital status, and diabetes duration. The diabetes self-efficacy questionnaire was adopted from the Indonesian version of the diabetes self-management self-efficacy scale (Rondhianto, 2012). The researchers retested the validity and reliability of the questionnaire. The results showed the questionnaire was valid and reliable (r = 0.456 – 0.658 > r table = 0.349; Cronbach alpha = 0.975 > 0.8 (n = 30)). The questionnaire comprises 20 items with a Likert scale (1 – 5). The questionnaire consists of five indicators: blood sugar check (3 items), diet and body weight (11 items), physical activity (2 items), medication (3 items), and foot care (1 item). The researcher categorized self-efficacy into five categories: very low (≤ 40), low (40 – 53.35), moderate (53.36 – 66.65), high (66.66 – 79.95), and very high (> 79.95).

Intervention

The independent variable is the FCEM intervention, and the dependent variable is self-efficacy. The researchers adopted the FCEM intervention from a previous study (Rondhianto et al., 2022). The researchers conducted the FCEM intervention in 10 sessions over 10 weeks in the intervention group. The intervention was delivered in two sections: education and training (6 sessions) and mentoring (four sessions) (Table 1). The control group did not receive the intervention but received standard care (Health education and POSBINDU PTM program). The control group only received health education about their disease when patients checked themselves at the PHC (once a month) and also through POSBINDU PTM (once a month) with education material non-specific about diabetes, which could be hypertension or other non-communicable disease (Figure 1).

Table 1. Summary of FCEM interventions

Session	Material	Method		
1	T2DM and self-management concept, and situational factors in self-management	Lectures, discussions, and counseling	Education	Home visit (±120')
2	Basic concepts of filial values, the nurse's role, family roles, and family caregiver empowerment		Education	Home visit (±120')
3	Diabetes diet management: Concepts and strategies	Lectures, discussions, demonstrations, and counseling	Education and training	Home visit (±120')
4	Physical activity management: Concepts and strategies		Education and training	Home visit (±120')
5	Medication and blood glucose monitoring management: concepts and strategies		Education and training	Home visit (±120')
6	Foot care and complication prevention: concepts and strategies; T2DM self-management plans		Education and training	Home visit (±120')
7	Follow up and support towards resource access	Discussions and counseling, mentoring	Mentoring	Home visit (±120')
8 - 10	Monitoring and evaluation: problem-solving		Mentoring	Telephone calls (±60')



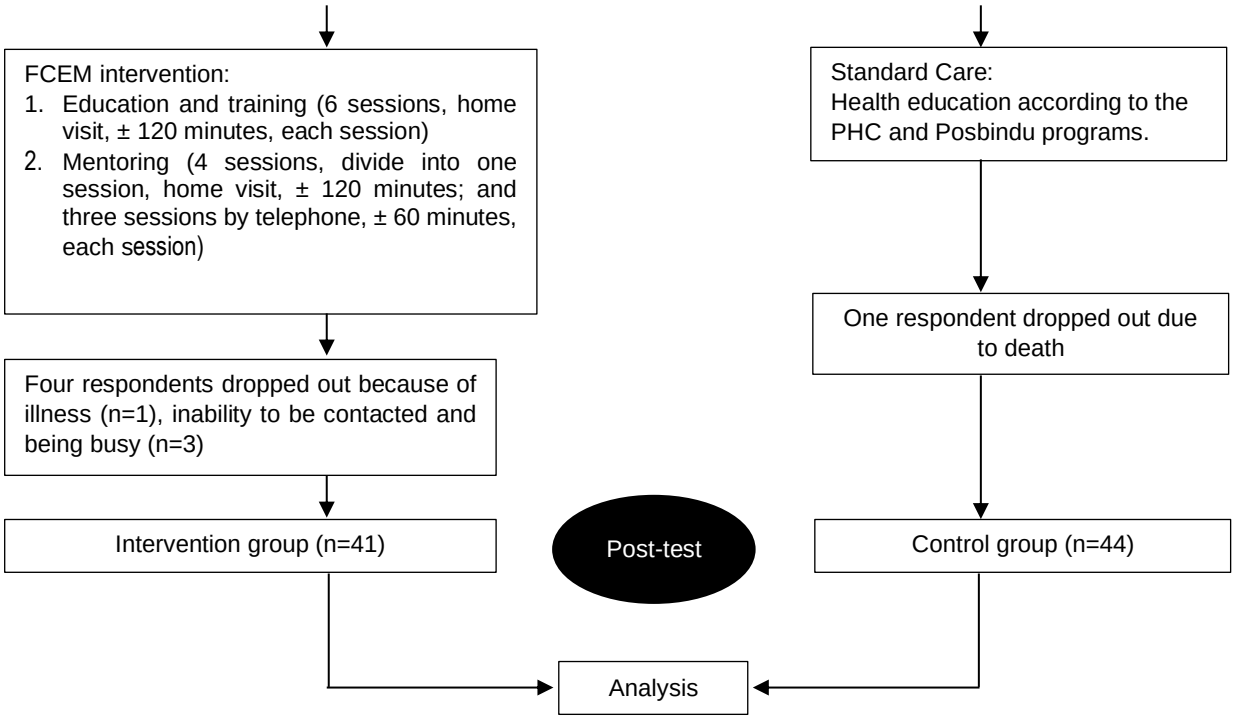


Figure 1. Flowchart of the study's procedure

Data Collection

The researchers collected data from March to July 2023 through direct interviews in the Banjarsengon PHC, Jember Regency. Measurements were done twice, before (pre-test) and two weeks after the intervention (post-test). At the beginning of the data collection process, the researchers explained the study's aims and benefits, procedures, and time required to prospective respondents. The prospective respondents also received an explanation of the possible risks and compensation obtained from the study. Those willing to become respondents signed a consent form stating they agreed to participate in the research. There is no coercion to participate, and the respondents can withdraw anytime.

Data Analysis

Data were analyzed descriptively and inferentially with the SPSS V.26 software. Descriptive analysis examined respondents' sociodemographic characteristics and the self-efficacy research variable with frequency distribution. Meanwhile, inferential analysis was conducted using the dependent t-test and the Mann-Whitney U test to analyze the effect of FCEM intervention on the self-efficacy of people with T2DM.

Ethical Consideration

The study has been approved and declared ethically appropriate by the Health Research Ethics Committee, Faculty of Nursing, Universitas Jember, with the number 051/UN25.1.14/KEPK/2023.

RESULTS

Table 2. Respondents' characteristics (n = 85)

Characteristics	Intervention (n = 41)		Control (n = 44)		Total (n = 85)		Homogeneity test	Self-efficacy difference
	n	%	n	%	n	%	Sig.	Sig.
Family caregiver								
Age (years)								
≤ 35	1	2.44	1	2.27	2	2.35	0.242	
36 – 45	4	9.76	9	20.45	13	15.29		
46 – 55	23	56.10	25	56.82	48	56.47		
56 – 65	13	31.71	9	20.45	22	25.88		
> 65	0	0.00	0	0.00	0	0.00		
Gender								
Female	35	85.37	39	88.64	74	87.06	0.621	
Male	6	14.63	5	11.36	11	12.94		
Education level								
No school	0	0.00	0	0.00	0	0.00	0.438	
Elementary school	6	14.63	5	11.36	11	12.94		
Junior high school	18	43.90	20	45.45	38	44.71		
Senior high school	15	36.59	16	36.36	31	36.47		
College	2	4.88	3	6.82	5	5.88		

Characteristics	Intervention (n = 41)		Control (n = 44)		Total (n = 85)		Homogeneity test	Self-efficacy difference
	n	%	n	%	n	%	Sig.	Sig.
Income level								
< RMW	32	78.05	32	72.73	71	75.29		
≥ RMW	9	21.95	12	27.27	14	24.71	0.802	
Marital status								
Not married	6	14.63	6	13.64	12	14.12	0.778	
Married	35	85.37	38	86.36	73	85.88		
Widow/widower	0	0.00	0	0.00	0	0.00		
Kinship								
Spouse	24	58.54	26	59.09	50	58.82	0.544	
Adult children	17	41.46	18	40.91	35	41.18		
People with T2DM								
Age (years)								
≤ 35	1	2.44	1	2.27	2	2.35	0.216	0.032
36 – 45	4	9.76	6	13.64	10	11.76		
46 – 55	16	39.02	21	47.73	37	43.53		
56 – 65	13	31.71	9	20.45	22	25.88		
> 65	7	17.07	7	15.91	14	16.47		
Gender								
Male	6	14.63	11	25.00	17	20.00	0.662	0.021
Female	35	85.37	33	75.00	68	80.00		
Education level								
No school	6	14.63	10	22.73	16	18.82	0.431	0.004
Elementary school	20	48.78	27	61.36	47	55.29		
Junior high school	7	17.07	3	6.82	10	11.76		
Senior high school	7	17.07	4	9.09	11	12.94		
College	1	2.44	0	0.00	1	1.18		
Employment								
Does not work	24	58.54	23	52.27	47	55.29	0.117	0.002
Civil servant	0	0.00	1	2.27	1	1.18		
Laborer	0	0.00	1	2.27	1	1.18		
Farmer	4	9.76	4	9.09	8	9.41		
Self-employed	2	4.88	7	15.91	9	10.59		
Retired	3	7.32	1	2.27	4	4.71		
Others	8	19.51	7	15.91	15	17.65		
Income level								
< RMW	32	78.05	32	72.73	71	75.29	0.802	0.038
≥ RMW	9	21.95	12	27.27	14	24.71		
Marital status								
Not married	0	0.00	0	0.00	0	0.00	0398	0.001
Married	31	75.61	40	90.91	71	83.53		
Widow/widower	10	24.39	4	9.09	14	16.47		
Diabetes duration								
< 5 Years	38	92.68	40	90.91	78	91.76	0.674	0.022
> 5 Years	3	7.32	4	9.09	7	8.24		

Note: RMW = Regency Minimum Wage

The results show that most family caregivers were 46 – 55 years old (56.47%), women (87.06%), had a junior high school education (44.71%) and had an income level lower than the regional minimum wage (75.29%). Most family caregivers were also married (85.88%) and were the spouses of people with T2DM (58.82%). Meanwhile, most people with T2DM were 46 – 55 years old (43.53%), female (80%), had an elementary school education (55.29%), did not work (55.29%), were married (83.53%), and had diabetes for less than five years (91.76%). There were no variance differences between the intervention and control groups ($p > \alpha = 0.05$), indicating the data were homogenous (Table 2).

Table 3. Self-efficacy level in the intervention and control groups (n = 85)

Self-efficacy level	Intervention group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Very low	6	14.63	0	0	5	11.36	5	11.36
Low	15	36.59	0	0	14	31.83	17	38.64
Moderate	17	41.46	11	26.83	20	45.45	13	29.55
High	3	7.32	17	41.46	5	11.36	8	18.18
Very high	0	0	13	31.71	0	0	1	2.27
Total	41	100	41	100	44	100	44	100

Table 3 shows that before the intervention, most respondents in the intervention and control group had a moderate level of self-efficacy (41.46%; 45.45%). However, after the FCEM intervention, most respondents had a high level of self-efficacy (41.46%), and no respondents' self-efficacy was in the low or very low category. Additionally, there is a decrease in self-efficacy in the post-test results of the control group. Most respondents had a low level of self-efficacy (38.64%), and 11.36% of respondents still had self-efficacy in the very low category.

Table 4. Effect of FCEM intervention on self-efficacy of people with T2DM

Group	Dependent t-test				Mann-Whitney U test		
	Test	Means	t	Sig.	Mean Rank	Z	Sig.
Intervention	Pre-test	52.80	-23.139	0.001	64.91	-7.922	0.001
	Post-test	73.15					
Control	Pretest	52.32	-7.399	0.001	22.58		
	Post-test	54.95					

*Note: Statistical test using dependent t-test and Mann-Whitney U Test with $\alpha = 0.05$

The dependent t-test result on the intervention group shows that the t-value was -29.139 > t table = 1.684 (p = 0.001), indicating that self-efficacy significantly differs before and after the FCEM intervention. Meanwhile, the dependent t-test on the control group obtained a t-value of -7.399 > t table = 1.681 (p = 0.001), indicating that although the control group did not receive an intervention, there were significant differences in self-efficacy during the pre-test and post-test.
However, the Mann-Whitney U test results show a mean rank value (64.91 vs. 22.58), which explains the difference in self-efficacy between the two groups. In addition, the calculated Z value is -7.922 > Z table = 1.96 (p = 0.001 < α = 0.05), indicating a significant difference in self-efficacy between the two groups. The increase in self-efficacy in the intervention group was higher than in the control group. Thus, the FCEM intervention significantly influenced the self-efficacy of people with T2DM.

DISCUSSION

The results show that most respondents in both groups (intervention and control groups) had moderate self-efficacy (Table 3). Several studies showed that self-efficacy is the main factor in forming diabetes self-management (Gurmu et al., 2018; Hurst et al., 2021; Kong & Cho, 2020; Oluma et al., 2020). Self-efficacy is the belief that someone can perform a particular action. It comprises four components: mastery experiences or performance accomplishments, vicarious experiences, emotional persuasion, and physiological and psychological conditions. Increasing self-efficacy can improve a person's cognitive, affective, motivational, and selective functions in choosing appropriate and desired behavior (Bandura, 2018).
In managing diabetes, self-efficacy is essential for people with T2DM. Self-efficacy is needed for them to perform independent management per the instructions from healthcare providers (Amer et al., 2018; Clara et al., 2021; Dehghan et al., 2017; Oluma et al., 2020). Several factors can influence diabetes self-efficacy in people with T2DM, including internal and external factors, such as sociodemographic conditions and social support. The results show that most people with T2DM respondents were older adults, female, had an elementary school education, were unemployed with an income lower than the RMW, married, and had T2DM for less than five years. The results also showed significant differences in self-efficacy based on the respondents' characteristics (Table 2).

Age is a significant determinant of diabetes prevalence. The 2021 IDF report stated that the incidence and prevalence of T2DM tend to increase with age, especially for people over 40 years old (International Diabetes Federation, 2021). The results align with previous studies stating that age negatively correlates with self-efficacy (Akturk & Aydinalp, 2018; Dehghan et al., 2017; Kuang et al., 2021). This relationship may be due to the body's decreasing physiological condition and ability to compensate for declining with age. Aging causes a decline in physical condition, reducing one source of self-efficacy (physical and psychological condition) (Bandura, 2018). Conversely, another study's results stated that age does not directly affect diabetes self-management. However, age influences self-efficacy, where self-efficacy is the main predictor affecting T2DM self-management (Clara et al., 2021).

This study's results differ from the 2021 IDF report, which stated that the prevalence of diabetes was slightly higher in men than women (International Diabetes Federation, 2021). However, this study's results align with the 2018 RISKESDAS report, which stated that diabetes prevalence is higher in the female population (Ministry of Health Indonesia, 2019). Previous studies have also indicated that gender influences diabetes self-efficacy. Women have higher self-efficacy than men, especially in managing roles (Hurst et al., 2021). Additionally, women have better psychological resilience than men, which may contribute to their higher self-efficacy (Kuang et al., 2021).

Next, socio-economic factors are also related to the prevalence of diabetes. This study's results follow the 2021 IDF report, which stated that globally, the prevalence of diabetes in low-middle-income countries is increasing yearly (International Diabetes Federation, 2021). Low education and income cause limited access to information and resources, possibly causing a decrease in diabetes self-efficacy (Akturk & Aydinalp, 2018; Amer et al., 2018; Do Nascimento et al., 2018; Qiu et al., 2020; Tapager et al., 2022). A person without a job has limited access to health services, so they tend to have low diabetes self-efficacy (Kong & Cho, 2020; Kuang et al., 2021).

Furthermore, this study's results follow several previous studies stating that social support influenced diabetes self-efficacy. Earlier studies also noted that marital status was positively related to self-efficacy. People with T2DM who have a life partner have better social support to improve self-efficacy in diabetes management (Chan et al., 2020; Oluma et al., 2020). Low social support can cause a decrease in psychological resilience, reducing diabetes self-efficacy (Kuang et al., 2021).

This study's results follow several previous studies stating a significant relationship between diabetes duration and self-efficacy. The longer a person has diabetes, the higher their risk of complications, which can lead to decreased physical and psychological conditions, reducing diabetes self-efficacy (Amer et al., 2018; Do Nascimento et al., 2018). A longer

duration of diabetes is also closely associated with poor glycemic control (Dehghan et al., 2017), giving rise to the risk of complications and perceived poor health, reducing self-efficacy (Amer et al., 2018; Tapager et al., 2022).

Moreover, the results of this study show that FCEM intervention can increase self-efficacy in people with T2DM. The intervention group experienced increased self-efficacy (moderate to high and very high). Meanwhile, in the control group, the respondents' self-efficacy decreased from low to very low (Table 3). The statistical analysis results also show a significant difference in self-efficacy between the intervention and control groups (Table 4).

This study's results align with several previous studies, which stated that family empowerment interventions could increase patient self-efficacy (Al Mahdi et al., 2020; Borimnejad et al., 2018). Empowering family caregivers can increase their family members with T2DM's self-efficacy (Abedini et al., 2020). Increasing self-efficacy can improve several internal processes, such as cognitive, affective, motivational, and selective function (Bandura, 2018). Additionally, self-efficacy can improve cognitive abilities in managing diabetes, increase positive emotions, reduce the burden perception, increase self-motivation to care for sick family members and increase the ability to choose and determine appropriate actions that must be taken in patient disease management (Matrook et al., 2018; Sousa et al., 2021).

Family empowerment through the FCEM can increase family knowledge and skills in T2DM self-management through education and training. Moreover, the mentoring process allows families to improve their disease management skills and be directly involved in providing care to their family members with T2DM at home (Rondhianto et al., 2020). Previous study results prove that when the FCEM intervention is given to family caregivers, it can increase their self-management capability (Rondhianto et al., 2022). Direct family involvement in disease management can improve the patient's perception of family social support (Ravi et al., 2018; Sakanashi & Fujita, 2017). The higher the family's support in managing the disease, the higher the patient's self-efficacy (Malini et al., 2020; Qiu et al., 2020). Therefore, nurses need to focus on the patient and their family members.

Nurses are essential in empowering family caregivers in disease management (Matrook et al., 2018; Sakanashi & Fujita, 2017). Support from nurses in education and advocacy is necessary to increase the readiness of family members who act as caregivers (Rondhianto et al., 2019). Family support can enhance the patient's compliance in conducting self-care. Adequate family support can increase the patient's knowledge and skills, leading them to perform better self-care (Rahayu et al., 2018). Diabetes self-management requires sustainable lifestyle modifications.

People with diabetes sometimes experience physical and mental disorders that often make them partially or wholly dependent on their families. Support from the family will strengthen self-confidence, leading to positive changes in self-care behavior (Matrook et al., 2018; Ravi et al., 2018; Sousa et al., 2021). Empowerment enables families to gain better knowledge and improve their technical skills to manage diabetes care (Matrook et al., 2018; Sousa et al., 2021).

Several previous studies also showed that educational interventions for patients effectively increase their self-efficacy, which is essential for influencing the adequacy of patient self-management (Al Mahdi et al., 2020; Borimnejad et al., 2018; Qiu et al., 2020). Self-efficacy positively correlates with reduced risk of complications, increased diet and physical management, medication adherence, blood glucose monitoring, and foot care. It shows that good knowledge is significantly related to self-efficacy (Malini et al., 2020; Qiu et al., 2020). Self-efficacy can also affect the behavior of people with diabetes, encouraging their confidence to behave positively and adjust and apply a healthy lifestyle to achieve their treatment goals (Amer et al., 2018; Clara et al., 2021).

The empowerment of family caregivers can increase their family members with T2DM's self-efficacy, self-esteem, and health literacy and reduce the burden of caring for family caregivers (Abedini et al., 2020; Jafari et al., 2020; Rabiei et al., 2020). This empowerment will help family caregivers to provide unique and efficient care, which leads to improved quality of care and increased self-efficacy (Jafari et al., 2020; Rabiei et al., 2020). Empowerment can also lead to increased self-awareness, self-efficacy, self-control, motivation, and competence so that empowered individuals will be critically aware of the importance of interacting with the environment (Matrook et al., 2018; Sousa et al., 2021).

Furthermore, direct family involvement in diabetes management can increase their self-efficacy sources. Family involvement can generate positive emotions (emotional persuasion) and improve the psychological condition of a person with T2DM. Families can also provide positive advice to patients by suggesting appropriate actions based on the insight they gained from discussions with other patients or families (vicarious experience). This insight is a source of self-efficacy (Bandura, 2018; Clara et al., 2021) that can reduce the burden of disease management. The patient's belief in positive behavior will also determine how they feel, think, and consistently behave, following the planned and recommended treatment. People with T2DM require high self-efficacy to resolve the disease and prevent complications optimally (Abedini et al., 2020; Chan et al., 2020). They need to maintain self-care activities that impact glycemic control (Amer et al., 2018; Dehghan et al., 2017; Hurst et al., 2021; Kong & Cho, 2020) to increase their quality of life (Kuang et al., 2021).

Nevertheless, this study has several limitations, including differences in the respondents' characteristics (family caregivers), such as age and level of education, which may cause differences in the ability to capture the information provided. This difference may also cause differences in how they implement the knowledge and skills provided to people with T2DM. Additionally, the researchers did not directly measure the family caregiver's ability to conduct T2DM self-management, which may cause bias.

This study's results contribute positively to the nursing field, especially in medical-surgical nursing, as it enriches the current theory and concept knowledge base regarding caring for people with T2DM by empowering family caregivers in diabetes self-management. This study's results can also be used as a reference for nurses and other health workers in providing services to people with T2DM, where empowering family caregivers in diabetes management is essential because it can increase the self-efficacy of people with T2DM. Therefore, this model may increase people with T2DM's compliance in undergoing diabetes self-management, thereby improving their health status.

CONCLUSION AND RECOMMENDATION

The FCEM intervention given to family caregivers can increase the self-efficacy of people with T2DM. Therefore,

nurses and other health service providers can use this intervention to empower family caregivers in T2DM self-management. Empowering family caregivers can increase their ability to manage diabetes by being actively involved in disease management, reducing the family members with T2DM's perceived burden of disease management and improving their self-efficacy. Further studies can be conducted to evaluate how to determine the influence of FCEM on other psychological factors of people with T2DM or family caregivers. More in-depth observations are needed to assess the family caregivers' role in carrying out their duties in T2DM self-management.

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CONFLICT OF INTEREST

The authors declare there was no conflict of interest in the study.

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