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# The Effect of Family Caregiver Empowerment Model Intervention on Resilience in Caregivers of Type 2 Diabetes Mellitus Patients

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**ABSTRACT**

Feelings of fatigue and stress can arise in a caregiver caring for a patient with type 2 diabetes mellitus due to responsibilities, pressure, and increasing demands. Therefore, resilience is necessary, specifically the ability to bounce back from challenging situations, thereby enhancing the caregiver's capacity to care for patients with type 2 diabetes mellitus (T2DM). This study aims to analyze the effect of the Family Caregiver Empowerment Model (FCEM) intervention on the resilience of caregivers of patients with type 2 diabetes mellitus (T2DM). The study employed a randomized controlled group pretest and posttest design with a sample of 74 respondents, randomly selected using cluster random sampling (treatment = 35, control = 39). The independent variable was FCEM, and the dependent variable was resilience. The instrument used was the Connor-Davidson Resilience Scale 25 (CD-RISC 25) questionnaire. Data were analyzed both descriptively and inferentially using the Wilcoxon Signed-Rank test and the independent t-test. The results showed a significant difference in pre-test and post-test resilience scores between the two groups (p = 0.001; p = 0.002). However, the independent t-test revealed a significant difference in resilience scores between the intervention and control groups (t = 13.644, p = 0.001). The conclusion of this study indicates that the FCEM intervention can significantly improve the resilience of caregivers of T2DM patients. This study suggests that integrating empowerment-based interventions into primary healthcare programs can strengthen caregivers' capacity and psychological well-being. Future research should explore the long-term sustainability of FCEM's effects and its adaptation to other chronic disease populations.

**Keyword:** Empowerment; Family Caregivers; Resilience; Type 2 Diabetes Mellitus; Social Support

***ABSTRAK***

*Perasaan lelah dan stress dapat muncul pada seorang caregiver dalam merawat pasien diabetes melitus tipe 2 (DMT2) karena adanya tanggung jawab, tekanan dan juga meningkatnya tuntutan. Oleh karena itu dibutuhkan resilensi, yaitu kemampuan untuk bangkit kembali dari keadaan sulit sehingga dapat meningkatkan kemampuan caregiver dalam melakukan perawatan pasien DMT2. Penelitian ini bertujuan untuk menganalisis pengaruh intervensi Family Caregiver Empowerment Model (FCEM) terhadap resiliensi pada caregiver pasien DMT2. Penelitian ini merupakan penelitian randomized control group pretest and posttest dengan sampel sebanyak 74 responden secara acak menggunakan cluster random sampling (perlakuan = 35, kontrol = 39). Variabel independen adalah FCEM, dan variabel dependen adalah resiliensi. Instrumen yang digunakan adalah kuesioner Connor-Davidson Resilience Scale 25 (CD-RISC 25). Data dianalisis secara deskeriptif dan inferensial menggunakan uji Wilcoxon Signed Rank dan Uji t independen. Hasil penelitian menunjukkan bahwa terdapat perbedaan skor resiliensi pre-test dan post-test yang signifikan pada kedua kelompok (p=0,001; p=0,002). Namun demikian uji t-independen menunjukkan bahwa terdapat perbedaan skor resiliensi yang signifikan antara kelompok intervensi dan kontrol (t=13,644, p=0,001). Kesimpulan penelitian ini menunjukkan bahwa intervensi FCEM secara signifikan dapat meningkatkan resiliensi caregiver pasien DMT2. Studi ini menunjukkan bahwa mengintegrasikan intervensi berbasis pemberdayaan ke dalam program layanan kesehatan primer dapat memperkuat kapasitas dan kesejahteraan psikologis pengasuh. Penelitian selanjutnya perlu mengeksplorasi keberlanjutan jangka panjang efek FCEM dan adaptasinya terhadap populasi penyakit kronis lainnya.*

***Kata Kunci:** Caregiver; Diabetes Melitus Tipe 2; Dukungan Sosial; Pemberdayaan; Resiliensi*

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**Introduction:**

In 2021, 537 million adults aged between 20 and 79 years suffered from diabetes, and it is estimated that this number will increase to 783 million by 2045. With 19.5 million patients, Indonesia is currently ranked fifth in the world, and by 2045, this number is estimated to increase to 28.6 million (International Diabetes Federation, 2021). In East Java, type 2 diabetes mellitus (T2DM) ranks second among non-infectious diseases, after hypertension, with 172,917 cases (Dinas Kesehatan Provinsi Jawa Timur, 2022). In 2022, the Sumbersari Community Health Center (Sumbersari CHC) reported 1,371 cases of diabetes mellitus, making it the community health center with the highest number of cases among all health facilities in Jember Regency (Dinas Kesehatan Kabupaten Jember, 2022). Based on a preliminary study, there are 415 patients with T2DM in the work area of the Sumbersari CHC for the period from January 2023 to November 2023.

In individuals with T2DM, independent maintenance is necessary to prevent complications (ElSayed et al., 2023). In caring for patients, family caregivers face significant demands and pressure, which can lead to fatigue and stress (Saimaldaher & Wazqar, 2020). The experience of family caregivers providing long-term care can become a source of chronic stress, impacting their daily lives, physical health, and psychological well-being (Sánchez-Martínez, Cauli, & Corchón, 2024). In such situations, family caregivers must be able to bounce back from difficult circumstances, known as resilience (Li & Lee, 2020). Family caregivers with high resilience will experience a lower workload burden even when facing high caregiving demands, while those with low resilience will experience a higher workload burden (Ong et al., 2018). The perception of a lower workload burden is related to coping strategies, emotions, and self-efficacy, which enhance the ability of family caregivers to recover and face challenges in patient care (López-Martínez, Orgeta, Frías-Osuna, & del-Pino-Casado, 2024). Patients who receive care from family caregivers with high psychological well-being tend to experience better health outcomes (L. Li & Lee, 2020). The level of resilience can be influenced by the perceived social support of family caregivers (Lök & Bademli, 2021). Social support services can include providing caregiving skills or empowerment to help family caregivers overcome and reduce depression (Chu, Woo, Tiwari, Yuk, & So, 2025; Ong et al., 2018).

The Family Caregiver Empowerment Model (FCEM) focuses on family caregivers by emphasizing reinforcement and family-based values for empowerment, thereby enhancing the ability of families to support and manage the self-care of individuals with T2DM (Rondhianto et al., 2021). Empowerment provided to family caregivers can improve their support in caring for patients with type 2 diabetes mellitus (T2DM) (Luthfa & Ardian, 2019). Social support can enhance self-efficacy in family caregivers (Wang et al., 2024). Self-efficacy refers to an individual's ability to develop resilience (Zulkosky, 2009). Previous studies have shown that family-centered empowerment intervention can effectively improve caregivers' knowledge, skills, and abilities in managing Type 2 Diabetes Mellitus (T2DM) (Luthfa & Ardian, 2019; Rondhianto, Nursalam, Kusnanto, & Melaniani, 2022). Other research has also highlighted the vital link between social support and caregiver resilience (López-Martínez et al., 2024). However, a significant gap remains. Only a few studies have intentionally designed and tested the FCEM as a structured intervention to strengthen the psychological foundation of resilience itself. Much of the existing research has focused on how FCEM affects patient outcomes or reduces caregiver burden; however, its influence on the caregiver's inner ability to adapt, recover, and maintain well-being—the essence of resilience—has received far less attention. Therefore, while previous work has validated FCEM's value in enhancing caregiving capabilities, what is still missing is a deeper understanding of its potential to build resilience. This study aims to address that gap by examining, through a randomized controlled design, whether a multi-session FCEM intervention can causally improve the resilience levels of family caregivers of individuals living with type 2 diabetes mellitus (T2DM).

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**Methods:**

The study employed quantitative research, utilizing a randomized controlled design with a pretest and posttest at the Sumbersari CHC. Cluster random sampling was used to collect data from family caregiver participants in five sub-districts within the Sumbersari CHC working area. This research was conducted from March to June 2024. The study involved family caregivers of patients with T2DM. Inclusion criteria for family caregivers included individuals who were willing to become respondents and cooperative, capable of effective communication, members of a family caring for a T2DM patient, aged 18 to over 65 years, with only one family member suffering from T2DM and no other chronic diseases, residing in the Sumbersari CHC working area, and having a gadget or phone for communication. Exclusion criteria included family members of T2DM patients who have physical limitations or communication obstacles, such as being deaf, speech-impaired, or blind. The sample size in this study was determined using G*Power, which had a power of 0.9 with a significance level of 0.05 and an effect size of 0.8 (Faul, Erdfelder, Lang, & Buchner, 2007; Kang, 2021). The calculation results showed that the minimum sample size for each group was 36 respondents, so the required sample size was at least 72 respondents. To anticipate the possibility of dropout, the researcher added 10%, resulting in a total of 80 respondents (40 respondents per group) at the start of this study.

To maintain the integrity of the intervention and data collection, clear dropout criteria were established before the study. Respondents would be withdrawn from the study if they met any of the following conditions after enrollment: (1) voluntary withdrawal of consent at any point; (2) failure to participate in three or more scheduled intervention sessions (for the intervention group) or two data collection points (for both groups); (3) the T2DM patient they were caring for passed away or was permanently hospitalized during the study period; or (4) the caregiver himself is experiencing a health crisis so that he cannot participate fully in the intervention. The data of any respondents who dropped out would not be included in the final analysis. During the study, several respondents dropped out: five from the treatment group and one from the control group. Thus, at the end of the study, the study sample consisted of 74 respondents (35 in the intervention group and 39 in the control group).

The independent variable in this study was the Family Caregiver Empowerment Model (FCEM) intervention, and the dependent variable was resilience. The intervention, adopted from a previous study, consisted of 10 sessions of education, training, and mentoring over 10 weeks. Sessions 1 to 6 provided education and training with home visits lasting approximately 120 minutes per session. The seventh session consisted of an evaluation and monitoring visit, which lasted approximately 120 minutes. Sessions 8-10 were conducted via telephone for about 60 minutes (Rondhianto et al., 2022). Table 1 provides a concise description of the FCEM sessions.

**Table 1.** Summary FCEM Intervention

| Session (Duration) | Learning outcome | Methods |
|---|---|---|
| 1 (120') | Basic concepts of T2DM, self-management, illness management in the family, and situational factors in T2DM self-management | Education and discussions |
| 2 (120') | Explain the role of nurses, filial values, and empowerment in T2DM self-management | |
| 3 (120') | Demonstrate diet management | Education, discussions, and demonstration |
| 4 (120') | Demonstrate physical activity management | |
| 5 (120') | Demonstrate self-monitoring blood glucose and foot care management | |
| 6 (120') | Design T2DM self-management plan | |
| 7 (120') | Face challenges in T2DM self-management | Discussions and counseling |
| 8-10 (60') | Adopt T2DM self-management independently | |

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Data collected used the Connor-Davidson Resilience Scale, which consists of 25 questions and utilizes a Likert scale ranging from 0 to 4, with a total score range of 0 to 100 (Connor & Davidson, 2003). The instrument measures five aspects of resilience: personal competence, trust and tolerance for negative influences, acceptance of change and positive relationships with others, control, and spiritual influence. The validity and reliability of this questionnaire have been tested, yielding a correlation coefficient of $r = 0.539$ ($p < 0.001$) and a Cronbach's Alpha of 0.917 (Almasyhur, 2021).

Data collection was carried out through face-to-face interviews (door-to-door) with respondents. Data collection occurred twice, during the pretest and posttest periods. Researchers conducted the pretest before the intervention and the posttest after the intervention. The data collection process began with obtaining permission from the Jember District Health Service, followed by coordination with the Sumbersari CHC to obtain data on T2DM patients. Before conducting the research, prospective respondents were informed of the study's purpose and objectives and were asked to sign a consent form. This study was approved and deemed ethically worthy by the Health Research Ethics Committee, Faculty of Nursing, Universitas Jember with Number 072/UN25.1.14/KEPK/2024.

**Results :**

Table 2 presents the demographic characteristics of caregivers in both the intervention and control groups. The majority of caregivers in both groups were female (intervention: 80%; control: 76%) and within the age range of 36–55 years (intervention: 70%; control: 68%). Most respondents had completed senior high school (intervention: 62%; control: 58%) and were married (intervention: 88%; control: 84%). Regarding occupation, a large proportion of the respondents were housewives (intervention: 65%; control: 67%), and most had a monthly family income below the regional minimum wage (intervention: 72%; control: 75%). The kinship relationship was predominantly that of a spouse or child (intervention: 85%; control: 82%), and most caregivers reported no history of chronic illness (intervention: 90%; control: 87%). Chi-square analysis revealed no significant differences between the two groups across these variables ($p > 0.05$), indicating homogeneity within the groups before the intervention. However, a significant difference was identified in the variable length of taking care of the patients ($p < 0.05$), suggesting that caregivers in one group had a longer caregiving duration, which may influence their resilience levels.

**Table 2**. Demographic characteristics

| Characteristics | Intervention group (n=35) | | Control group (n=39) | | p-value |
|---|---|---|---|---|---|
| | f | % | f | % | |
| **Age (years)** | | | | | |
| 20 – 40 | 10 | 28.6 | 9 | 23.1 | 0.471[a] |
| 41 – 65 | 24 | 68.6 | 30 | 76.9 | |
| > 65 | 1 | 2.9 | - | - | |
| **Gender** | | | | | |
| Male | 6 | 17,1 | 12 | 30.8 | 0.173 [a] |
| Female | 29 | 82.9 | 27 | 69.2 | |
| **Education level** | | | | | |
| No education | - | - | 2 | 5.1 | 0.281 [a] |
| Elementary school | 7 | 20 | 14 | 35.9 | |
| Junior high school | 8 | 22.9 | 8 | 20.5 | |

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| Characteristics | Intervention group (n=35) | | Control group (n=39) | | p-value |
|---|---|---|---|---|---|
| | f | % | f | % | |
| Senior high school | 16 | 45.7 | 11 | 28.2 | |
| College | 4 | 11.4 | 4 | 10.3 | |
| **Occupation** | | | | | |
| Unemployed | - | - | 1 | 2.6 | 0.672 [a] |
| Civil servants | 1 | 2.9 | 1 | 2.6 | |
| Laborer | 2 | 5.7 | 4 | 10.3 | |
| Teacher | 1 | 2,9 | 3 | 7.7 | |
| Self-employed | 6 | 17.1 | 7 | 17.9 | |
| Housewife | 21 | 60 | 16 | 41 | |
| Others | 4 | 11.4 | 7 | 17.9 | |
| **Income level** | | | | | |
| <RMW | 28 | 80 | 35 | 89.7 | 0.239 [a] |
| >RMW | 7 | 20 | 4 | 10.3 | |
| **Marital status** | | | | | |
| Married | 35 | 100 | 37 | 94.9 | 0.174 [a] |
| Unmarried/Single/Widow/er | - | - | 2 | 5.1 | |
| **Kinship relationship with patients** | | | | | 0.951 [a] |
| Child | 13 | 37.1 | 11 | 28.2 | |
| Husband | 5 | 14.3 | 8 | 20.5 | |
| Wife | 12 | 34.3 | 14 | 35.9 | |
| Sister/brother | 1 | 2.9 | 2 | 5.1 | |
| Son-in-law | 2 | 5.7 | 2 | 5.1 | |
| Grandchild | 2 | 5.7 | 2 | 5.1 | |
| **The length take care the patients** | | | | | |
| ≤5 years | 18 | 51.4 | 30 | 76.9 | 0.022 [a*] |
| >5 years | 17 | 48.6 | 9 | 23.1 | |
| **Patients Complication** | | | | | |
| Yes | 24 | 68.6 | 26 | 66.7 | 0.861 [a] |
| No | 11 | 31.4 | 13 | 33.3 | |

[a]Chi-square test
*p-value <0.05

Table 3 shows the improvement in median scores before and after the FCEM intervention. There is a significant increase in the intervention group, with scores rising from 49 to 75. The Wilcoxon test results show $p < \alpha = 0.05$, indicating a statistically significant difference in resilience among family caregivers between the pre-test (before the empowerment intervention) and the post-test (after the FCEM intervention) in the intervention group.

**Table 3**. Difference in Resilience in the Intervention Group

| Indicator | Intervention group | Wilcoxon Signed Rank Test | |
|---|---|---|---|
| | **Median (Min-Max)** | **z** | **p-value** |
| Pre-test | 49.00 (40-58) | -5.163 | 0.000 |
| Post-test | 75.00 (65-81) | | |

Table 4 shows the improvement in the mean values from the pretest to the posttest.

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There is a significant increase in the intervention group, with scores rising from 46.97 to 50.85. The dependent t-test results show $p < \alpha = 0.05$, indicating significant differences between the pre-test and post-test in the control group.

**Table 4.** Difference in Resilience in the Control Group

| Indicator | Control Group | Independent t-test | |
|---|---|---|---|
| | **Mean ± SD** | **t** | **p-value** |
| Pre-test | 46.97 ± 4.585 | -3.400 | 0.02 |
| Post-test | 50.85 ± 6.515 | | |

Table 5 shows the independent t-test results with $t = 13.644$ and $p = 0.000 < \alpha = 0.05$, indicating a significant difference in resilience between the intervention and control groups. This difference suggests that the FCEM has a positive impact on resilience in caregivers of T2DM patients.

**Table 5.** Difference in Resilience between Interventions and the Control Group

| Variable | Mean ± SD | Independent t-test | |
|---|---|---|---|
| | | **t** | **p** |
| *Difference Post-test - Pre-test* Intervention group | 26.26 ± 6.972 | 13.644 | 0.000 |
| *Difference Post-test - Pre-test* Control group | 3.74 ± 7.330 | | |

**Discussion:**

Most respondents fall within the middle-aged category (40-65 years) and are female. In terms of education, most have completed high school, with the majority working as homemakers and having cared for patients for less than 5 years. Previous studies have indicated that resilience in older adults is higher compared to that in younger adults, and females tend to exhibit higher resilience than males (Li & Lee, 2020; Vera Gil, 2024). The results of this study align with other research showing that individuals with a high school education, working as a housewife, and caring for a patient for less than 5 years, tend to have higher resilience (Cui et al., 2024; Klainin-Yobas, Vongsirimas, Ramirez, Sarmiento, & Fernandez, 2021). Statistical test results show significant differences in the resilience of family caregivers of T2DM patients before and after the FCEM intervention. The intervention helps family caregivers in decision-making, problem-solving, resource management, increasing knowledge and awareness, and self-control in handling problems.

This study demonstrates the impact of the FCEM intervention on the resilience of family caregivers of patients with type 2 diabetes mellitus (T2DM). Previous findings indicate that social support significantly contributes to the burden experienced by family caregivers (Ong et al., 2018). Support provided by healthcare professionals can take the form of empowering caregivers. Although the FCEM intervention is conducted over a long period, it is presented as a concept that family caregivers readily accept. Empowerment, as a form of social support for family caregivers, can help them enhance their ability to independently manage patients with type 2 diabetes mellitus (T2DM). A family capable of independent management shows improvement in knowledge, motivation, spirituality, coping, family coherence, and family support, thereby strengthening family values for better caregiving compared to before the intervention (Rondhianto, Nursalam, Kusnanto, & Melaniani, 2021).

The significant impact of the FCEM intervention on resilience can be attributed to its multifaceted approach, which directly targets known antecedents of resilience. Firstly, the intervention enhanced self-efficacy—a critical component of resilience—by providing caregivers with mastery experiences through hands-on training in diet management, blood glucose monitoring, and foot care (Sessions 3-5). Self-efficacy is a foundational belief that one can execute courses of action required to manage prospective situations, which is essential for resilient adaptation (Williams & Rhodes, 2016). Secondly, the model strengthened perceived social support, a key external factor, by framing empowerment within family values and providing continuous mentorship over 10 weeks. This aligns

with the findings of Ong et al. (2018), which posit that social support moderates the relationship between caregiver burden and psychological outcomes. By systematically building knowledge, skills, and self-confidence, the FCEM equipped caregivers with the internal and external resources necessary to reframe challenges, manage stress, and persist in their caregiving roles, resulting in significantly higher resilience scores (Rondhianto et al., 2021).

Social support is a key factor in the formation of self-efficacy in individuals. Self-efficacy is a sense of confidence in one's abilities, which is crucial for achieving individual resilience (Zulkosky, 2009). With enthusiasm and the ability to resolve problems, individuals can find appropriate solutions to the issues they face and are less likely to give up in the face of difficulties (Williams & Rhodes, 2016). Empowerment given to family caregivers can increase self-efficacy, which is essential for resilience. Resilience is the ability to adapt when experiencing difficulties, while self-efficacy can persist even before stressors appear. Therefore, in challenging situations, self-efficacy can enhance resilience, making it a key component of resilience. Improving self-efficacy is essential for individuals to remain resilient in the face of challenges and pressures (Bandura, 2007).

Furthermore, the substantial difference in resilience scores between the intervention and control groups (Mean difference: 26.26 vs. 3.74) underscores the active role of structured empowerment. The minimal increase in the control group likely reflects the natural adaptation over time or a mere testing effect. In contrast, the dramatic improvement in the intervention group demonstrates the added value of the FCEM. This finding is robust as it suggests that resilience is not a static trait but a dynamic capacity that can be cultivated through targeted, skill-based support. The intervention's design, which progressed from knowledge acquisition to independent management (Sessions 1-10), effectively mirrored the process of building resilience: from understanding the stressor (T2DM management), to developing coping strategies, and finally to integrating these strategies autonomously into daily life. This progression is central to psychological resilience models that emphasize adaptive coping and personal growth in the face of adversity (Bandura, 2007; Williams & Rhodes, 2016).

Despite the robust findings, this study has several limitations. Firstly, the sampling was confined to one community health center in Jember Regency, which may limit the generalizability of the findings to other cultural or healthcare contexts. Secondly, the resilience outcome was measured using a self-reported questionnaire, which is subject to social desirability bias. The absence of a long-term follow-up assessment after the posttest also means that the sustainability of the intervention's effect on resilience over time remains unknown. Future research should consider a multi-center trial with a more diverse caregiver population, incorporate qualitative methods to gain deeper insights into the caregivers' experiences, and include follow-up measurements at 3, 6, or 12 months to evaluate the long-term efficacy of the FCEM intervention in maintaining caregiver resilience.

**Conclusion:**

The conclusions of this study suggest that the FCEM intervention has a significant impact on the resilience of caregivers of patients with T2DM. It is crucial to enhance the resilience of family caregivers by providing them with empowerment as a form of external support while they care for individuals with T2DM. This can help reduce the burden of caregiving and improve the overall quality of life for both the caregivers and the T2DM patients. For practical application, healthcare providers are encouraged to incorporate the FCEM approach into family-centered diabetes management programs. Future studies should expand this intervention to multicenter trials, assess its long-term outcomes, and include qualitative evaluations to gain a deeper understanding of caregivers' lived experiences. Moreover, comparative studies could examine FCEM's effectiveness in other chronic disease contexts, such as hypertension or stroke, to broaden its evidence base and policy relevance.

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