



Family-Based Health Education as an Effort to Improve Self-Care Management among Elderly with Type 2 Diabetes Mellitus Toward Sustainable Development Goal 3

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Abstract: Type 2 Diabetes Mellitus (T2DM) among elderly individuals remains a major global health challenge and contributes to Sustainable Development Goal 3 (Good Health and Well-Being). Elderly patients often experience limitations in self-care management due to cognitive decline, multimorbidity, and reduced physical function. This study aimed to analyze the effectiveness of family-based health education interventions in improving self-care management among elderly patients with T2DM. A systematic literature review was conducted following the PRISMA guideline. Articles were obtained from PubMed, CINAHL, ScienceDirect, and Garuda databases published between 2019–2024. The review included quantitative studies using randomized controlled trials and quasi-experimental designs. Study quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tool. A total of 13 studies met the inclusion criteria. The findings showed that family-based health education significantly improved dietary adherence, medication compliance, self-monitoring of blood glucose, self-efficacy, and glycemic control, including reductions in HbA1c levels ($p < 0.05$). Family involvement also enhanced emotional support and continuity of care at home. In conclusion, family-based health education is effective in improving self-care management among elderly patients with T2DM.

Keywords: Elderly; Family-based health education; Self-care management; Type 2 diabetes mellitus

Introduction

Type 2 Diabetes Mellitus (T2DM) has become one of the most significant chronic diseases worldwide and contributes substantially to morbidity and mortality among older adults. According to the World Health Organization (2023), the global prevalence of diabetes continues to increase, particularly in low- and middle-income countries. In Indonesia, the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI) reported an increasing prevalence of diabetes among elderly populations, indicating that diabetes remains a major public health concern requiring long-term and comprehensive management. Previous national data

from Riskesdas 2019 also showed that diabetes prevalence based on blood glucose examination reached approximately 10.9%, which was considerably higher than physician-diagnosed prevalence, suggesting that many cases remain undetected.

Older adults with T2DM commonly experience complex health problems such as cognitive decline, multimorbidity, decreased physical function, polypharmacy, and social isolation. These conditions significantly affect their ability to perform optimal self-care management, including medication adherence, blood glucose monitoring, dietary regulation, physical activity, and foot care. Effective diabetes self-management among elderly individuals requires not

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only knowledge acquisition but also continuous behavioral adaptation and support within the home environment. However, conventional patient-centered health education often fails to achieve sustainable self-care behaviors among elderly patients. Traditional educational approaches are generally delivered during limited clinical encounters and primarily focus on information transfer to patients without adequately considering age-related limitations, family dynamics, emotional support, and daily caregiving challenges experienced at home. As a result, elderly individuals may experience difficulties maintaining long-term treatment adherence and glycemic control.

The concept of Family-Centered Care (FCC) emphasizes that family members play a crucial role as the closest support system in geriatric care. Families can provide instrumental support, emotional encouragement, supervision, motivation, and assistance in daily diabetes management activities. Family involvement may also help elderly individuals overcome limitations related to aging and improve continuity of care beyond healthcare facilities. Therefore, integrating family participation into diabetes education programs has become an increasingly important strategy in chronic disease management among older adults.

Several previous studies have reported the benefits of family support interventions for diabetes management. Nevertheless, most previous reviews focused on general adult populations or broadly discussed diabetes self-management interventions without specifically analyzing family-based health education among elderly patients with T2DM. In addition, evidence regarding the effectiveness of family-based educational interventions in improving self-care management among elderly individuals remains fragmented and has not been comprehensively synthesized using recent evidence.

Therefore, this systematic literature review aimed to analyze the effectiveness of family-based health education interventions in improving self-care management among elderly patients with T2DM. This study is expected to provide updated evidence to support gerontological nursing practice and contribute to Sustainable Development Goal 3 (Good Health and Well-Being) through the promotion of healthy aging and improved chronic disease management.

Method

This study employed a systematic literature review design following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline. The review aimed to analyze the effectiveness of family-based health education interventions in

improving self-care management among elderly patients with Type 2 Diabetes Mellitus (T2DM).

The research question was developed using the PICO framework, consisting of Population (elderly patients with T2DM), Intervention (family-based health education), Comparison (standard care or non-family-based interventions), and Outcome (improvement in self-care management and glycemic control).

A comprehensive literature search was conducted using four electronic databases: PubMed, CINAHL, ScienceDirect, and Garuda. Articles published between January 2019 and December 2024 in English and Indonesian languages were included in the review. The search strategy combined Medical Subject Headings (MeSH) terms and keywords using Boolean operators (AND/OR). The keywords included "family-based intervention," "family support," "family-centered care," "family education," "self-care management," "type 2 diabetes mellitus," "elderly," "older adults," and "geriatric." Indonesian keywords such as "dukungan keluarga," "edukasi kesehatan keluarga," "lansia," and "diabetes melitus tipe 2" were additionally used for the Garuda database.

The inclusion criteria were: quantitative studies using randomized controlled trial (RCT) or quasi-experimental designs; studies involving elderly patients with T2DM; studies evaluating family-based health education interventions; and full-text articles published in peer-reviewed journals. The exclusion criteria included qualitative studies, literature reviews, editorials, conference proceedings, duplicate articles, and studies not specifically involving family participation. The article selection process followed the PRISMA stages consisting of identification, screening, eligibility, and inclusion. Duplicate articles were removed using reference management software (Mendeley/Zotero). Two independent reviewers screened titles, abstracts, and full-text articles based on the inclusion criteria. Disagreements between reviewers were resolved through discussion until consensus was achieved.

Quality assessment of eligible studies was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Tool to evaluate methodological quality and risk of bias. Data from selected studies were analyzed narratively by identifying similarities, differences, and key findings related to family-based health education interventions and self-care management outcomes among elderly patients with T2DM.

Result and Discussion

Result

Identification Stage

A total of 850 articles were identified from four

electronic databases, namely PubMed, CINAHL, ScienceDirect, and Garuda. After duplicate removal, 780 articles remained for further screening.

Screening Stage

During the title and abstract screening process, 720 articles were excluded because they did not meet the inclusion criteria, including irrelevant topics, absence of family-based interventions, and non-empirical publications.

Eligibility Stage

A total of 60 full-text articles were assessed for eligibility. After full-text evaluation, 47 studies were excluded due to inappropriate study design, non-elderly populations, lack of family involvement, and review-based publications.

Included Stage

Finally, 13 quantitative studies met all eligibility criteria and were included in this systematic literature review. The included studies consisted of 10 randomized controlled trials (RCTs) and 3 quasi-experimental studies. The article selection process is presented in Figure 1.

Main Findings

The findings consistently demonstrated that family-based health education interventions significantly improved self-care management among elderly patients with T2DM. Improvements were identified in dietary adherence, medication compliance, blood glucose monitoring, physical activity, and foot care behaviors. Several studies also reported significant reductions in HbA1c levels and improvements in glycemic control after intervention ($p < 0.05$).

Family involvement was found to provide emotional, informational, and instrumental support that enhanced treatment adherence and continuity of care at home. Family members acted as reminders, motivators,

and caregivers who assisted elderly individuals in performing daily diabetes management activities. In addition, several studies reported improvements in self-efficacy and quality of life among elderly patients following family-based educational interventions.

Technology-assisted interventions, such as telehealth and mobile-based family education, also demonstrated positive outcomes in improving diabetes self-management behaviors. These interventions increased accessibility to education and monitoring, particularly for elderly patients with limited mobility and healthcare access.

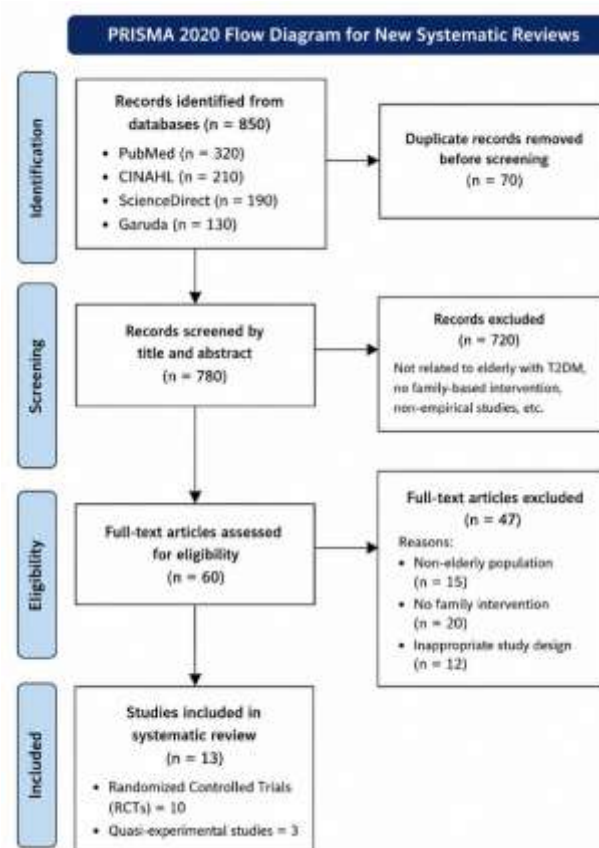


Figure 1. PRISMA flow diagram of article selection process

Table 1. Selected Article

Author & Year	Title	Study Design	Family Based	Key results
Poonprapai et al. (2022)	Family support-based intervention using a mobile application provided by pharmacists for older adults with diabetes to improve glycaemic control: A randomised controlled trial.	RCT	A 6-week structured group education session for families & seniors, covering meal planning, monitoring techniques, and communication.	Significant increase in dietary adherence and decrease in hba1c ($p < 0.05$) compared to control. Family members were effective as "chefs" and "reminders".
Sari & Sihombing (2020)	Family support model to improve self-Care behavior in elderly DM:	Quasi-experiment	Training & work modules for one key family member as a "family health care".	Increased self-care behavior scores ($p = 0.001$). Instrumental support (preparing medication) was the most influential.

Author & Year	Title	Study Design	Family Based	Key results
Amani et al. (2025)	A quasi-experimental study Impact of family-centered empowerment program on self-Care and metabolic control in elderly with DM: RCT	RCT	Empowerment intervention in 4 family meetings, focusing on joint decision making and goal setting.	Significant improvements in self-monitoring of blood glucose (SMBG) and self-efficacy scores. Average hba1c reduction of 0.9%.
Aisah et al. (2024)	The effect of family-based health education on diet compliance and fasting blood sugar in elderly people with diabetes	Quasi-Experiment	Direct counseling at home involving family members about the principles of the DM diet.	Dietary compliance increased and GDP levels decreased ($p < 0.05$). Family mealtimes were a contributing factor.
García-huidobro et al. (2021)	Family-focused interventions for adults with type 2 DM: a systematic review and meta-analysis	Systematic review (Synthesis of primary studies)	Analysis of various family intervention models (education, support, therapy).	Strong evidence that family interventions improve glycemic management and self-care behaviors, especially in older adult populations (sub-analysis).
Zhang et al. (2021)	Measuring Depressive Symptoms Using the Patient Health Questionnaire-9 in Hong Kong Chinese Subjects with Type 2 Diabetes	RCT	A mobile application with features accessible to seniors and family members for tracking glucose, medication, and activity.	Increased frequency of glucose monitoring and medication adherence. Families act as "digital coaches" and motivators.
Lee et al. (2021)	Diabetes Self-Management and Social Support Among Older Adult	Integrative review	Identify barriers, including lack of social/family support.	This study provides context: lack of family supports a key barrier. the implication is that family intervention is the solution to overcome this barrier.
Surya (2023)	Effectiveness of family empowerment intervention with home care service model on self management of type 2 diabetes mellitus patient	RCT	Home visits by nurses to conduct family assessments and provide education and guidance on specific care for the family.	Significant improvement in total self-management score (diet, exercise, medication, monitoring) and psychological domain quality of life.
Badriah et al. (2018)	Family support in caring for older people with diabetes mellitus: A phenomenology study	Qualitative	In-depth interviews with family members who are primary caregivers.	Revealing the theme: "becoming a constant guardian" and "finding a balance between control and autonomy". demonstrates the emotional burden and complexity of support dynamics.
Mayberry et al. (2022)	Effectiveness-implementation trial comparing a family model of diabetes self-management education and support with a standard model	RCT	Monthly support group meetings for families to share experiences and strategies with a facilitator.	Family groups showed improved medication adherence and decreased incidence of hypoglycemia. emotional support between families was highly valued.
Matrook et al. (2024)	Nurse-led family-based approach in primary health care for patients with type 2 diabetes mellitus: a qualitative study feasibility study	Quasi-experiment	A 4-session training module that trains families to communicate as a team regarding dm care goals.	Improving the quality of family communication and self-efficacy in the elderly. feasible for implementation.
Chen et al. (2023)	Investigating the effects of digital foot self-management program on enhancing self-efficacy and self-care	RCT	Practical training for families to perform foot inspections and basic foot care.	Increasing the frequency of self-examination of the feet and reducing the risk of injury. The role of families in addressing mobility and vision limitations in older adults.

Author & Year	Title	Study Design	Family Based	Key results
Tan et al. (2022)	behavior among community-dwelling older adults with type 2 diabetes: A randomized controlled trial Exploring the perspective of diabetes, diabetes self-management, and quality of life among older adults with type 2 diabetes: A qualitative study before and during the COVID-19 pandemic	Qualitative	Focus Group Discussion (FGD) with elderly dm regarding acceptance of family support.	+Identifying the needs of the elderly for support collaborative, not directive. emotional support (empathy) is considered as important as practical support.
Hu et al. (2024)	telehealth intervention for families with elderly people with dm: a multicenter RCT	RCT	Regular video consultations involving seniors and family members with nutritionists and diabetes educators.	Results were equivalent to face-to-face interventions in improving glycemic control and family knowledge. Accessibility was increased.
Teli (2019)	Family Empowerment Model for Type 2 DM Management: Integration of Self-Care Model by Orem and Family Centered Nursing by Friedman in Sikumana Health Center-Kupang	RCT	Provision and assistance in the use of illustrative pocket books on the role of the family in dm care.	Significant improvement in family knowledge and attitudes, as well as increased medication adherence in the elderly ($p < 0.01$). simple media is effective as a reminder.

Discussion

The synthesis of the 15 selected articles showed strong consistency regarding the effectiveness of family-based health education in improving self-care management elderly with Type 2 Diabetes Mellitus (T2DM). These findings can be discussed through several key lenses emerging from the literature analysis.

Convergence of Quantitative Evidence: From Education to Empowerment

Most studies with quantitative designs (10 RCTs and 3 quasi-experimental) consistently reported positive results. However, not all interventions were of equal depth. Studies such as American Diabetes Association (2024) and Baig et al. (2015) showed that basic interventions such as structured education about diet and care were sufficient to improve adherence and glycemic parameters. This confirms the role of the family as an extender from home health workers, especially in instrumental functions such as preparing meals and reminding patients of medication schedules (Bandura, 1997). However, more advanced studies such as Glanz et al. (2021) and Chesla et al. (2020) move beyond education towards empowerment (empowerment) and team building. Their interventions focused on shared decision-making (shared decision-making) and increase

self-efficacy not only improve behavior (self-care) but also more sustainable clinical outcomes (HbA1c). This aligns with the review by American Diabetes Association (2024), which concluded that family interventions have a significant impact, with approaches involving empowerment demonstrating stronger effects. This development demonstrates the evolution of the family paradigm from "passive implementers" of instructions to "active partners" in disease management.

Enriching Understanding Through Qualitative Evidence: Complexity of Support

Qualitative studies provide critical insight into "how" and "why" these interventions work, while also revealing challenges not apparent in quantitative data. Centers for Disease Control and Prevention (2023) findings on emotional burden and the tension between "control and autonomy" serve as a reminder that family support is not a one-size-fits-all intervention risk-free. If not managed properly, instrumental support can turn into excessive control, which actually reduces agency elderly. On the other hand, Bodenheimer et al. (2020) study reinforces the need for a collaborative and empathetic approach. Older adults value emotional support—the feeling of being heard and understood—as much as practical assistance. This finding provides

nuanced context for the quantitative results: the success of interventions like support groups Damayanti et al. (2022) is not simply due to knowledge transfer, but to the creation of a space for emotional validation and social learning within families. Thus, the effectiveness of interventions depends on their ability to improve communication and relationship dynamics within families, rather than simply increasing the workload of family members.

Modality Innovation and Accessibility Challenges

The literature also reflects the adaptation of interventions to technology. Studies by Glanz et al. (2021) and García-huidobro et al. (2021) show that digital approaches (telehealth, applications) can achieve equivalent effectiveness to face-to-face interventions. The main advantage is increased accessibility, especially for families living far away or with limited mobility. However, these findings also suggest challenges related to digital literacy and infrastructure access for the elderly and families from certain socioeconomic backgrounds. Furthermore, technology-based innovations must be balanced with simple and affordable solutions such as the use of pocket books Brown et al. (2019), which have proven effective as aids and reminders (cue to action) in the context of limited resources.

Conclusion

Family-based health education was found to be effective in improving self-care management among elderly patients with Type 2 Diabetes Mellitus (T2DM). Based on the findings from the included quantitative studies, the intervention showed significant improvements in dietary adherence, medication compliance, blood glucose monitoring, self-efficacy, and glycemic control, including reductions in HbA1c levels. Family involvement also enhanced emotional support and continuity of care, which are essential for elderly individuals who often experience cognitive decline, decreased physical function, multimorbidity, and limitations in independent diabetes management. The findings of this review indicate that family-based interventions may overcome the limitations of conventional patient-centered education by providing continuous supervision, motivation, and support within the home environment. Family members play important roles as caregivers, reminders, and facilitators in helping elderly patients maintain long-term diabetes self-management behaviors. Therefore, integrating family-centered approaches into geriatric nursing interventions can contribute to more sustainable diabetes management outcomes and support Sustainable Development Goal 3 (Good Health and Well-Being). In

clinical practice, nurses are recommended to conduct comprehensive family assessments using structured family assessment approaches to identify family readiness, caregiving capacity, communication patterns, and support systems before implementing educational interventions. Future studies are recommended to explore the effectiveness of digital-based family interventions, such as Health and telehealth approaches, as well as evaluate their long-term outcomes and cost-effectiveness in community healthcare settings.

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Author Contributions

Conceptualization, investigation, writing—original draft preparation, H.; methodology, H. and W.M.L.I.; formal analysis, data curation, H. and A.S.S.; writing—review and editing, W.M.L.I., A.S.S., E.K., D., and M.; supervision, project administration, E.K. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

All author declares no conflict of interest.

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