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Effectiveness of Self-Management in Improving Glycemic Control Among Patients with Type 2 Diabetes Mellitus: A Literature Review

Elin Angraini[1], Hernizah[2], Erika[3*]
[1,2,3]Master of Nursing Study Program Faculty of Nursing Universitas Riau, Pekanbaru, Indonesia

Corresponding author: rika_hardi@yahoo.com

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ABSTRACT

Type 2 diabetes mellitus is a chronic disease that requires continuous management to prevent complications. One important approach is self-management, which includes patients' ability to regulate diet, physical activity, treatment adherence, and independent monitoring of blood glucose levels. This study aimed to analyze the effectiveness of self-management interventions on glycemic control in patients with type 2 diabetes mellitus. The method used was a literature review, with databases including PubMed, ScienceDirect, and Google Scholar. The keywords used were "self-management," "type 2 diabetes mellitus," "glycemic control," "HbA1c," and "DSMES." A total of 10 articles were obtained from the literature search. The selected articles were screened using predefined inclusion and exclusion criteria, and methodological quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools. The results of the review indicate that diabetes self-management education and support (DSMES) interventions generally have a positive effect on reducing HbA1c levels and improving patients' self-care behaviors. However, the effectiveness of the intervention varies depending on program duration, delivery methods, and population characteristics. In addition, social support factors and the use of digital technology contribute to enhancing the success of self-management. In conclusion, self-management interventions may contribute to improving glycemic control in patients with type 2 diabetes mellitus, but it requires a continuous, integrated, and patient-centered approach.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of the non-communicable diseases with a steadily increasing prevalence across countries and has become a major global health challenge (Khavere et al., 2025). This condition is characterized by elevated blood glucose levels resulting from impaired insulin function, either due to insulin resistance or decreased insulin production (Abe et al., 2025). If not optimally controlled, T2DM can lead to various chronic complications, such as cardiovascular disease, kidney disorders, neuropathy, and visual impairment, all of which contribute to a reduced quality of life (Siminerio et al., 2025).

Diabetes management is not solely focused on medical therapy but also requires active patient involvement in controlling their health condition, where the concept of self-management becomes crucial as it reflects an individual's ability to manage the disease independently, including activities such as dietary regulation, increased physical activity, regular blood glucose monitoring, and adherence to medication, with patients' active participation in these activities being a key determinant of successful glycemic control (Gu et al., 2025).

Educational approaches such as diabetes self-management education and support (DSMES) have been widely developed as strategies to enhance patients' self-management capabilities

(Yimer et al., 2025). This program not only provides disease-related information but also promotes behavioral change, improves patient self-efficacy, and supports decision-making in diabetes management (Tamiru et al., 2023). Several studies have demonstrated that DSMES interventions can positively impact HbA1c reduction, improve treatment adherence, and promote healthier lifestyles (Abe et al., 2025; Yimer et al., 2025).

However, the effectiveness of self-management interventions has not been consistent across all studies. Some research reports significant improvements in glycemic control, while others show less optimal outcomes, particularly among specific groups such as younger patients or in interventions with shorter durations. This suggests that the success of self-management is influenced by multiple factors, including intervention methods, patient engagement, and environmental or social support (Adu et al., 2024a).

Furthermore, the development of digital technology offers new alternatives to support diabetes management. The use of health applications, telemonitoring, and digital platforms enables patients to receive continuous education and independently monitor their health conditions. These technologies also have the potential to enhance interactions between patients and healthcare providers. However, their effectiveness and implementation still require further investigation, particularly in terms of accessibility and sustainability (Höld et al., 2025; Vlasakova et al., 2023).

Based on these findings, a comprehensive review is needed to integrate existing evidence and provide a clearer understanding of the effectiveness of self-management in controlling type 2 diabetes mellitus. Therefore, this study aims to analyze the role of self-management interventions, particularly through the DSMES approach, in improving glycemic control and self-care behaviors among patients with T2DM.

METHOD

This study employed an integrative literature review approach to synthesize evidence regarding the effectiveness of self-management interventions in improving glycemic control among patients with type 2 diabetes mellitus. An integrative review was selected because it allows the inclusion and analysis of studies with various research designs, including randomized controlled trials, quasi-experimental studies, cross-sectional studies, pilot intervention studies, systematic reviews, and meta-analyses. The review aimed to identify, examine, compare, and integrate findings from previous studies related to diabetes self-management interventions and their impact on glycemic outcomes. The synthesis of findings was conducted narratively and descriptively to provide a comprehensive understanding of the current evidence.

The research question was developed using the PICO (Population, Intervention, Comparison, Outcome) framework. The population included patients with type 2 diabetes mellitus, the intervention consisted of self-management interventions or diabetes self-management education and support (DSMES), the comparison involved standard care or the absence of specific interventions, and the outcomes focused on glycemic control indicators such as HbA1c levels, blood glucose levels, and self-care behaviors. Based on this framework, the review question was formulated as follows: “How effective are self-management interventions in improving glycemic control among patients with type 2 diabetes mellitus?”

Search Strategy

The literature search was conducted between January and March 2026 using several electronic databases, including PubMed, ScienceDirect, Google Scholar, Wiley Online Library, Semantic Scholar, ResearchGate, and BMC. The search strategy was developed using combinations of Medical Subject Headings (MeSH) terms, keywords, and Boolean operators (AND/OR). The primary search string used in PubMed was: (“type 2 diabetes mellitus” OR T2DM) AND (“self-

management" OR "diabetes self-management education" OR DSME OR DSMES) AND ("glycemic control" OR HbA1c OR "blood glucose"). The search strategy was adapted according to the syntax requirements of each database. Searches were limited to articles published between 2015 and 2026, written in English or Indonesian, and available in full-text format.

Table 1. Database Search Strategy

Database	Search String
PubMed	("type 2 diabetes mellitus" OR T2DM) AND ("self-management" OR DSME OR DSMES) AND ("glycemic control" OR HbA1c OR "blood glucose")
ScienceDirect	("type 2 diabetes") AND ("self-management education") AND ("glycemic control")
Wiley Online Library	("diabetes self-management" OR DSMES) AND HbA1c
Google Scholar	"type 2 diabetes mellitus" AND self-management AND HbA1c
Semantic Scholar	T2DM AND DSMES AND glycemic control
ResearchGate	"self-management intervention" AND "type 2 diabetes mellitus"
BMC	("diabetes self-care") AND ("glycemic control")

The inclusion criteria comprised studies that examined self-management interventions or diabetes education programs among patients with type 2 diabetes mellitus and reported outcomes related to glycemic control or self-care behaviors. Eligible studies included randomized controlled trials, quasi-experimental studies, observational studies, systematic reviews, meta-analyses, and pilot intervention studies. Articles without full-text access, opinion papers, editorials, commentaries, theses, dissertations, protocols, narrative reviews, or studies unrelated to self-management interventions in type 2 diabetes mellitus were excluded from the review.

The study selection process was conducted using a structured screening approach adapted from the PRISMA flow framework to improve transparency in identifying and selecting relevant studies. Initially, all identified articles were screened based on titles and abstracts. Subsequently, full-text screening was performed to assess eligibility according to the predefined inclusion and exclusion criteria. Duplicate articles and studies not aligned with the review objectives were excluded during the selection process.

The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools according to each study design. Different appraisal checklists were applied for randomized controlled trials, quasi-experimental studies, cross-sectional studies, systematic reviews, and pilot intervention studies to ensure methodological appropriateness. The appraisal focused on several aspects, including clarity of research objectives, appropriateness of study design, participant selection, validity and reliability of measurements, management of bias, and adequacy of statistical analysis. The appraisal results were reported descriptively rather than through a universal numerical scoring system, considering the differences in methodological standards across study designs. Overall, the included studies demonstrated acceptable methodological rigor, although several studies presented limitations related to study design, generalizability, and potential bias.

Data from the selected studies were extracted, compared, and synthesized narratively to identify patterns, similarities, differences, and key findings related to the effectiveness of self-management interventions in improving glycemic control among patients with type 2 diabetes mellitus.

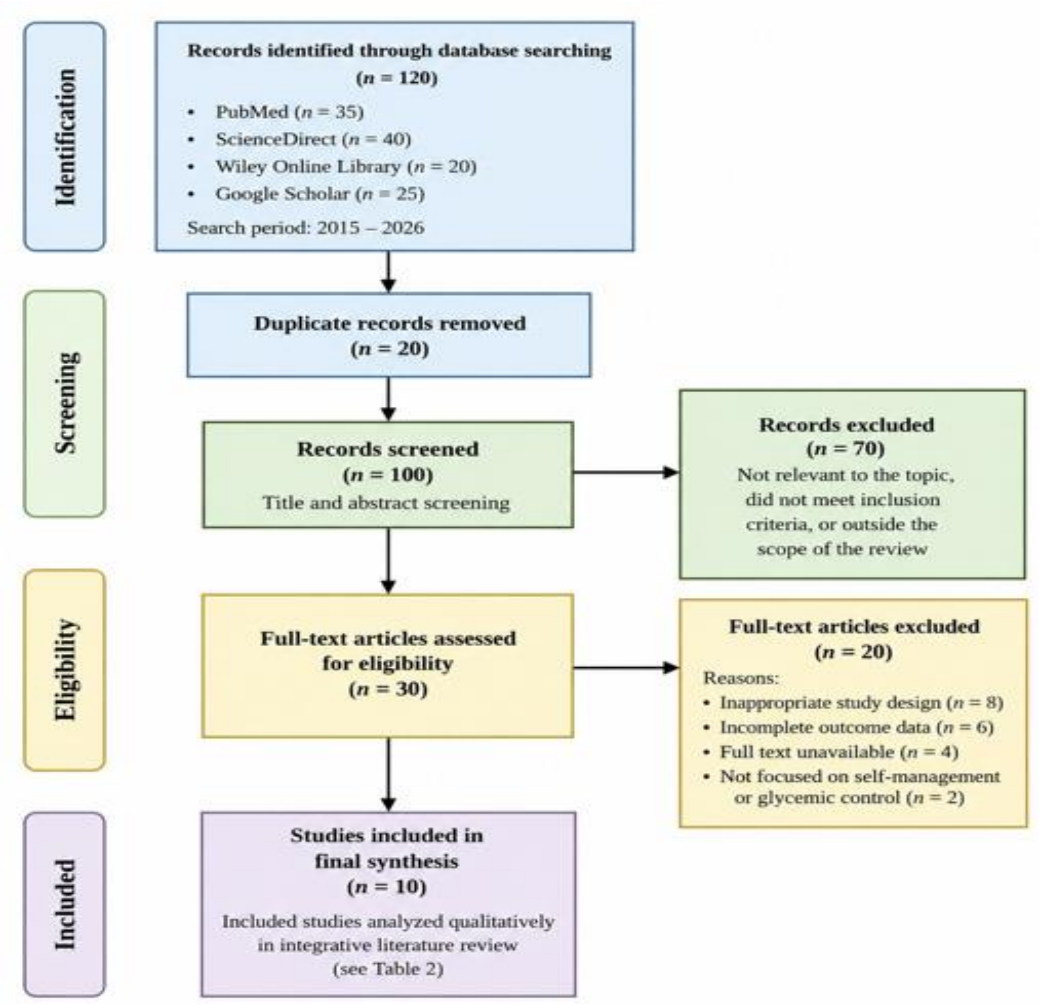

Figure 1. Article Identification and Screening Process

The study selection process was conducted using a structured screening approach adapted from the PRISMA flow framework to improve transparency in identifying and selecting relevant studies. A total of 120 articles were initially identified through database searching from PubMed, ScienceDirect, Google Scholar, Wiley Online Library, Semantic Scholar, ResearchGate, and BMC. After removing 20 duplicate records, 100 articles remained for title and abstract screening. During this stage, 70 articles were excluded because they were not relevant to the review objectives or did not meet the inclusion criteria. Subsequently, 30 full-text articles were assessed for eligibility. Of these, 20 articles were excluded due to inappropriate study focus, lack of relevant outcomes, incomplete full-text availability, or insufficient discussion regarding self-management interventions in type 2 diabetes mellitus. Finally, 10 studies fulfilled all eligibility criteria and were included in the final synthesis. The included studies consisted of various research designs, including randomized controlled trials, quasi-experimental studies, cross-sectional studies, systematic reviews, meta-analyses, and pilot intervention studies.

Table 2. Quality Appraisal of Included Studies

No	Author & Year	Study Design	JBI Appraisal Summary	Overall Appraisal
1	Khavere, S., Hadjiconstantinou, M., Miksza, J., Hagan, J., Salisu-Olatunji, S., Naderpour, S., Hassen, S. N., Karimi, Z., & Gillies, C. L. (2025). *Effectiveness of self-management interventions on type*	Systematic review & meta-analysis	The review demonstrated a clearly defined research question, comprehensive search	Good methodological quality

	2 diabetes among young adults (18–45 years): A systematic review and meta-analysis. *Diabetic Medicine, 42*(10), e70127. DOI: https://doi.org/10.1111/dme.70127		strategy, appropriate inclusion criteria, and suitable synthesis methods. Most methodological criteria of the JBI appraisal were fulfilled.	
2	Yimer, Y. S., Addissie, A., Kidane, E. G., Reja, A., Abdela, A. A., & Ahmed, A. A. (2025). *Effectiveness of diabetes self-management education and support interventions on glycemic levels among people living with type 2 diabetes in the WHO African Region: A systematic review and meta-analysis*. *Frontiers in Clinical Diabetes and Healthcare, 6*, 1554524. DOI: https://doi.org/10.3389/fcdhc.2025.1554524	Systematic review & meta-analysis	The study applied appropriate review methods, comprehensive literature searching, and adequate data synthesis. Minor limitations related to heterogeneity across studies were identified.	Good methodological quality
3	Gu, S., Wang, X., Shen, F., Gu, H., Zhang, N., Zhou, Y., & Wang, X. (2025). *Type 2 diabetes self-management behaviors and glycemic control under China's diabetes prevention and control action program*. *International Journal of Public Health, 70*, 1608067. DOI: https://doi.org/10.3389/ijph.2025.1608067	Cross-sectional study	The study used valid measurement methods and appropriate statistical analyses. However, causal relationships between interventions and outcomes could not be established due to the observational design.	Moderate methodological quality
4	Adu, F. A., Poku, C. A., Adu, A. P., & Owusu, L. B. (2024). *The role of social support and self-management on glycemic control of type 2 diabetes mellitus with complications in Ghana: A cross-sectional study*. *Health Science Reports, 7*(4), e2054. DOI: https://doi.org/10.1002/hsr2.2054	Cross-sectional study	The study clearly described participants and outcome measurements, although potential confounding factors and limitations in causal inference were identified.	Moderate methodological quality
5	Tamiru, S., Dugassa, M., Amsalu, B., Bidira, K., Bacha, L., & Tsegaye, D. (2023). *Effects of nurse-led diabetes self-management education on self-care knowledge and self-care behavior among adult patients with type 2 diabetes mellitus attending diabetes follow-up clinic: A quasi-experimental study design*. *International Journal of Africa Nursing Sciences, 18*, 100548. DOI: https://doi.org/10.1016/j.ijans.2023.100548	Quasi-experimental study	The intervention procedures and outcome assessments were adequately described. Nevertheless, the absence of randomization and control of confounding variables may increase bias risk.	Moderate methodological quality
6	Höld, E., Hemetek, U., Tremmel, K., Aubram, T., Grüblbauer, J., Wiesholzer, M., Schwanda, M., & Stieger, S. (2025). *A randomized controlled trial in a 14-month longitudinal design to analyze*	Randomized controlled trial	The study demonstrated strong methodological rigor, including clear randomization	Good methodological quality

	the effects of a peer support instant messaging service intervention to improve diabetes self-management and support. *Diabetology, 6*(5), 44. DOI: https://doi.org/10.3390/diabetology6050044		procedures, intervention consistency, and reliable outcome measurements, although participant blinding was limited.	
7	Marni, L., Armaita, A., Yoselina, P., & Anggita, K. D. (2025). *Pengaruh diabetes self management education (DSME) terhadap peningkatan pengetahuan pada penderita diabetes melitus tipe 2 di wilayah kerja Puskesmas Pariaman Kota Pariaman tahun 2022*. *Jurnal Kesehatan Komunitas, 11*(1), 74–80. DOI: https://doi.org/10.25311/keskom.Vol11.Iss1.2076	Quasi-experimental study	The study adequately explained the intervention and outcome evaluation. However, limitations related to sample size and absence of randomization reduced methodological strength.	Moderate methodological quality
8	Febriani, B., Anggondowati, T., Silalahi, J. V., Fatimah, F., Nurhalimah, N., & Audila, H. (2025). *The benefits of diabetes self management education (DSME) on glycemic control (HbA1c) among adult type 2 diabetes mellitus patients in Southeast Asia: A systematic review*. *Indonesian Journal of Global Health Research, 7*(4), 295–306. URL: https://jurnal.globalhealthsciencegroup.com/index.php/IJGHR/article/view/6360	Systematic review	The review applied relevant search strategies and inclusion criteria, although variation among included studies may affect evidence consistency.	Good methodological quality
9	Ma, L., Zhao, W.-S., Wang, R., Huo, S.-S., Chu, S.-Y., Shi, L.-H., Chen, Y., & Zhong, Y.-Q. (2026). *Effect of diabetes self-management education in type 2 diabetes management: A systematic umbrella review of meta-analysis*. *BMC Endocrine Disorders, 26*(1), 79. DOI: https://doi.org/10.1186/s12902-026-02183-4	Umbrella review	The review demonstrated comprehensive evidence synthesis and strong methodological transparency. The appraisal process and evidence integration were clearly reported.	Good methodological quality
10	Vlasakova, M., Muzik, J., Holubová, A., Fiala, D., Arsand, E., Urbanová, J., Janíčková Žďárská, D., Brabec, M., & Brož, J. (2023). *A telemedicine system intervention for patients with type 1 diabetes: Pilot feasibility crossover intervention study*. *JMIR Formative Research, 7*, e35064. DOI: https://doi.org/10.2196/35064	Pilot intervention study	The intervention and outcome assessments were clearly described, although the pilot design and relatively limited sample size may reduce generalizability.	Moderate methodological quality

The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools according to each study design. The appraisal process evaluated the clarity of study objectives, appropriateness of methodology, participant selection, validity of measurements, and adequacy of data analysis. The appraisal findings were reported descriptively according to the methodological strengths and limitations identified in each study

design. This quality appraisal was conducted to enhance the credibility and rigor of the synthesized evidence in this integrative literature review.

RESULTS

A total of 120 records were initially identified through database searching. After removing 20 duplicate records, 100 articles remained for title and abstract screening. During the screening process, 70 articles were excluded because they did not meet the inclusion criteria or were not relevant to the review objectives. Subsequently, 30 full-text articles were assessed for eligibility, and 20 articles were excluded due to inappropriate study focus, incomplete full-text availability, or insufficient outcome reporting. Finally, 10 studies were included in the final synthesis.

The ten selected studies were published between 2023 and 2026 and focused on various self-management interventions in glycemic control among patients with type 2 diabetes mellitus. These studies encompassed a range of approaches, including self-care education, blood glucose monitoring, lifestyle modification, and technology-based support. The study designs included systematic reviews and meta-analyses, cross-sectional studies, quasi-experimental studies, randomized controlled trials, pilot intervention studies, and systematic reviews. The key characteristics of the included articles are summarized in the table below.

Table 3. Characteristics and Main Findings of the Analyzed Studies

No	Author & Year	Study Design	Setting	Focus	Key Findings
1	Khavere et al (2025)	Systematic review & meta-analysis	Multi-country studies involving young adults with T2DM	Effectiveness of self-management interventions on glycemic control	Structured and multi-component self-management interventions significantly reduced HbA1c levels and improved glycemic outcomes among young adults with type 2 diabetes mellitus.
2	Yimer et al (2025)	Systematic review & meta-analysis	WHO African Region	DSMES interventions and glycemic control	Diabetes self-management education and support (DSMES) significantly improved glycemic control, particularly when interventions were culturally adapted and continuously delivered.
3	Gu et al (2025)	Cross-sectional study	China national diabetes prevention and control program	Self-management behaviors and glycemic control	Strong positive associations were found between self-management behaviors and improved glycemic control among patients with type 2 diabetes mellitus.
4	Adu et al (2024)	Cross-sectional study	Ghana	Social support and diabetes self-management	Social support significantly enhanced patient adherence to self-management practices and

					contributed to better glycemic outcomes.
5	Tamiru et al (2023)	Quasi-experimental study	Diabetes follow-up clinic, Ethiopia	Nurse-led DSME intervention	Nurse-led DSME significantly improved patient knowledge, self-care behavior, and diabetes management practices.
6	Höld et al (2025)	Randomized controlled trial	Europe, 14-month longitudinal intervention	Peer-support instant messaging intervention	Digital peer-support interventions improved patient engagement, self-management adherence, and long-term diabetes support.
7	Marni et al (2025)	Quasi-experimental study	Puskesmas Pariaman, Indonesia	Effect of DSME on patient knowledge	DSME interventions significantly increased patient knowledge and supported improved self-management behaviors among patients with type 2 diabetes mellitus.
8	Febriani et al (2025)	Systematic review	Southeast Asia	DSME effectiveness on HbA1c	DSME consistently reduced HbA1c levels and improved glycemic control across diverse Southeast Asian populations.
9	Ma et al (2026)	Umbrella review of meta-analyses	Global studies	Effectiveness of DSME in type 2 diabetes management	Continuous and structured DSME interventions demonstrated significant benefits in glycemic control and long-term diabetes management outcomes.
10	Vlasakova et al (2023)	Pilot feasibility crossover intervention study	Telemedicine-based diabetes management program	Telemedicine intervention and diabetes self-management	Telemedicine interventions improved patient adherence, self-monitoring behavior, and diabetes self-management engagement, although broader implementation requires further evaluation.

A total of ten studies were included in this review after the screening process. These studies examined various aspects of the effectiveness of self-management in controlling type 2 diabetes mellitus across diverse global settings, including the effectiveness of educational interventions, social support, the use of digital technology, and the influence of self-care behaviors on glycemic control. Despite variations in study design and population characteristics, a consistent pattern emerged suggesting potential associations between self-management interventions and improved glycemic control, the importance of continuous education, and the need for strengthening healthcare systems to support long-term diabetes management.

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The analyzed studies indicate that the management of type 2 diabetes mellitus is highly dependent on self-management interventions, such as diabetes self-management education (DSME), self-monitoring of blood glucose, lifestyle modification, and social and technological support. DSME interventions were consistently reported to improve knowledge, self-care behaviors, and glycemic control, particularly when delivered through healthcare professional–based approaches such as nurse-led interventions (Tamiru et al., 2023). In addition, social support plays a significant role in improving patient adherence to disease management and achieving better clinical outcomes (Adu et al., 2024a).

The use of digital technology, such as peer-support-based instant messaging services and digital self-care solutions, demonstrates potential in enhancing patient engagement and sustaining self-management practices (Höld et al., 2025). However, its effectiveness remains dependent on technology access, digital literacy, and integration with existing healthcare systems. Other studies also confirm that effective self-management behaviors are positively associated with optimal glycemic control within the framework of national diabetes prevention and control programs (Gu et al., 2025).

Overall, the reviewed studies suggest that self-management interventions may contribute to improved glycemic control and self-care behaviors among patients with type 2 diabetes mellitus (Febriani et al., 2025; Khavere et al., 2025; Yimer et al., 2025). Nevertheless, variations in effectiveness persist, influenced by individual factors, social context, and access to healthcare services.

Despite the availability of diabetes management guidelines, several key challenges were identified across the reviewed studies:

1. Variability in self-management adherence
   Differences in knowledge, motivation, and social support influence the success of self-management interventions.
2. Limited access to technology-based interventions
   Not all patients have access to or the ability to use digital technologies to support self-management.
3. Variability in the effectiveness of educational interventions
   The success of DSME depends on delivery methods, intervention duration, and healthcare provider involvement.
4. Limited service integration
   A lack of integration between self-management interventions and healthcare systems may hinder program sustainability.
5. Need for long-term support
   Diabetes management requires a sustained approach, yet many interventions remain short-term.

Based on the ten analyzed studies, several research gaps were identified:

1. Limited large-scale studies comparing the effectiveness of various self-management models across countries and healthcare settings.
2. Lack of longitudinal studies assessing the sustainability of self-management interventions on glycemic control.
3. Limited evaluation of digital technology implementation in low-resource settings.
4. Insufficient cost-effectiveness analyses of self-management interventions.
5. Limited research on the integration of self-management into national health policies.
6. Scarcity of studies exploring artificial intelligence–based or automated systems to support diabetes self-management.

These gaps highlight the need for future research that integrates the development of self-management interventions with healthcare system strengthening to sustainably improve glycemic control and the quality of life of patients with type 2 diabetes mellitus.

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DISCUSSION

This integrative literature review demonstrates that self-management interventions play an important role in improving glycemic control among patients with type 2 diabetes mellitus (T2DM). The reviewed studies consistently showed that interventions such as diabetes self-management education and support (DSMES), social support enhancement, lifestyle modification, and digital health utilization contribute positively to reducing HbA1c levels, improving self-care behaviors, and increasing patient adherence to treatment. However, the effectiveness of these interventions varies depending on intervention methods, duration, patient characteristics, and healthcare system support.

One of the most consistently reported interventions was DSMES. Several studies included in this review showed that DSMES significantly improved patient knowledge, self-care behavior, and glycemic control. Tamiru et al. (2023) reported that nurse-led DSMES interventions improved self-care knowledge and diabetes management behavior among patients with T2DM. Similarly, Marni et al. (2025) found that DSME interventions significantly increased patient understanding regarding diabetes management in primary healthcare settings. These findings are consistent with systematic review evidence from Febriani et al (2025) and Yimer et al (2025) which demonstrated that DSMES interventions were associated with significant reductions in HbA1c levels across various populations.

Across the reviewed studies, DSMES interventions generally demonstrated clinically meaningful improvements in glycemic control, particularly in structured and long-term programs lasting more than six months. Systematic reviews and meta-analyses consistently reported reductions in HbA1c levels following DSMES interventions, especially when education was combined with behavioral counseling, continuous monitoring, and follow-up support. Nurse-led interventions appeared effective in improving patient knowledge and self-care adherence, whereas digital and telemedicine-based interventions demonstrated potential benefits in maintaining long-term patient engagement and self-monitoring behavior. However, the magnitude and sustainability of glycemic improvement varied depending on baseline HbA1c levels, intervention duration, patient adherence, and healthcare accessibility.

The effectiveness of DSMES may be explained by its ability to improve patient knowledge, self-efficacy, and decision-making skills related to diabetes care. Patients who understand dietary regulation, medication adherence, blood glucose monitoring, and physical activity management are more likely to engage in effective self-care behaviors. Structured educational interventions also strengthen patient confidence in managing chronic disease independently, which contributes to better glycemic outcomes. Nevertheless, the success of DSMES interventions is highly influenced by continuity, frequency of sessions, patient motivation, and the involvement of healthcare professionals. Short-term educational programs without follow-up support may produce limited long-term effects.

In addition to educational interventions, social support was identified as another important factor influencing diabetes self-management. Adu et al (2024a) demonstrated that patients receiving stronger family and community support achieved better glycemic control compared to those with limited support systems. Social support may improve emotional well-being, treatment adherence, and motivation to maintain healthy behaviors. Family involvement in dietary management, medication reminders, and emotional encouragement may help patients sustain self-management practices over time. These findings indicate that diabetes management should not only focus on individual behavior change but also incorporate family-centered and community-based approaches to improve long-term outcomes.

The integration of digital technology into diabetes self-management interventions also showed promising results. Höld et al (2025) reported that peer-support instant messaging interventions improved patient engagement and sustained self-management behavior over a 14-month period. Similarly, Vlasakova et al (2023) found that telemedicine-based interventions

enhanced patient adherence and self-monitoring practices. The increasing use of mobile applications, telehealth systems, and digital monitoring platforms offers new opportunities to support continuous diabetes care, especially for patients requiring long-term monitoring and education.

Digital interventions provide several advantages, including easier access to health information, real-time monitoring, and continuous communication between patients and healthcare providers. These technologies may also reduce healthcare access barriers among patients living in remote areas or those with limited mobility. However, despite their potential benefits, digital interventions still face several challenges. Limited digital literacy, inadequate internet access, and unequal technology availability may reduce the effectiveness of these approaches, particularly in low-resource settings. In addition, long-term sustainability and integration of digital systems within healthcare services remain important concerns.

This review also identified that self-management behaviors are strongly associated with improved glycemic control. Gu et al (2025) reported that effective self-management behaviors, including regular glucose monitoring, healthy eating patterns, medication adherence, and physical activity, were positively correlated with better glycemic outcomes. These findings support the concept that T2DM management requires active patient participation in daily disease management. Medical treatment alone is insufficient without consistent self-care practices performed by patients themselves.

Although the reviewed studies generally demonstrated positive outcomes, variations in intervention effectiveness were identified across studies. Several factors may contribute to these differences, including patient age, duration of diabetes, educational level, health literacy, social support, and healthcare access. Younger patients may respond differently to interventions compared to older adults due to differences in lifestyle, motivation, and technology utilization. Cultural background and healthcare system characteristics may also influence intervention success, particularly in multicultural and resource-limited settings.

The findings of this review highlight the importance of implementing comprehensive and patient-centered approaches in diabetes management. Interventions combining education, social support, behavioral counseling, and digital technology appear to produce better outcomes compared to single-component interventions. Multidisciplinary collaboration among nurses, physicians, dietitians, and family members is essential to strengthen patient adherence and optimize long-term diabetes management.

Despite the positive findings, several limitations were identified in the reviewed studies. Many studies used observational or quasi-experimental designs, which may limit causal interpretation of intervention effectiveness. Sample sizes and follow-up durations also varied considerably across studies, potentially affecting the consistency of findings. Furthermore, some digital interventions were evaluated only in pilot or short-term studies, limiting evidence regarding long-term sustainability and effectiveness.

This review also identified several important research gaps. First, there is still limited evidence from large-scale longitudinal studies evaluating the long-term sustainability of self-management interventions. Second, evidence regarding cost-effectiveness of DSMES and digital health interventions remains insufficient, particularly in developing countries. Third, the implementation of technology-based self-management programs in low-resource settings requires further investigation due to challenges related to infrastructure and accessibility. Finally, limited studies have explored the integration of artificial intelligence and automated systems in supporting diabetes self-management and personalized care.

Overall, the reviewed evidence suggests that self-management interventions may contribute to improved glycemic control among patients with type 2 diabetes mellitus. DSMES, social support, and digital health interventions were consistently associated with better self-care behaviors and reductions in HbA1c levels. However, intervention effectiveness appears to depend

on patient engagement, continuity of support, accessibility of healthcare resources, and integration within healthcare systems.

CONCLUSION

This integrative literature review aimed to analyze the effectiveness of self-management interventions in improving glycemic control among patients with type 2 diabetes mellitus. The reviewed evidence suggests that interventions such as diabetes self-management education and support (DSMES), social support enhancement, lifestyle modification, and digital health utilization may contribute to improved self-care behaviors, treatment adherence, and reductions in HbA1c levels. However, the strength of evidence remains influenced by variations in study design, intervention duration, outcome measurement, and patient characteristics across studies. Therefore, although self-management interventions appear beneficial for glycemic control, further longitudinal and large-scale intervention studies are needed to determine the most effective and sustainable self-management models for patients with type 2 diabetes mellitus.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

EA : Conceptualization, Writing –Original Draft Preparation
Her : Data Collection, Investigation, Data Curation
Er : Supervision, Review and Editing, Validation (Final Confirmation)

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Personal expenses

Availability of data and materials

All articles included in this literature review are available and can be obtained directly from the respective authors upon request.

Competing interests

The authors declare no competing interests.

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