



**EFFECTIVENESS OF GROUP-BASED HEALTH BELIEF MODEL (HBM)
INTERVENTIONS ON BEHAVIORAL CHANGE AMONG PATIENTS WITH TYPE 2
DIABETES MELLITUS: A SYSTEMATIC REVIEW**

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ABSTRACT

Type 2 diabetes mellitus (T2DM) requires effective self-management to prevent complications, yet sustaining healthy behaviors remains challenging. The Health Belief Model (HBM) is widely used to promote behavioral change through educational interventions. This systematic review evaluated the effectiveness of group-based HBM interventions in improving health behaviors among adults with T2DM. A systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. PubMed, Scopus, and Google Scholar were searched for studies published between January 2021 and June 2026. Eligible studies included randomized controlled trials, quasi-experimental studies, controlled trials, and pretest–posttest intervention studies involving adults with T2DM receiving group-based HBM interventions. Study quality was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist. Of the 255 articles identified, four studies met the inclusion criteria. Group-based Health Belief Model (HBM) interventions consistently improved self-care, medication adherence, dietary compliance, physical activity, blood glucose monitoring, self-efficacy, perceived susceptibility, and perceived benefits while reducing perceived barriers. However, improvements in glycated hemoglobin (HbA1c) were inconsistent across studies. Group-based HBM interventions effectively improve health behaviors in adults with T2DM and may strengthen Diabetes Self-Management Education (DSME). Further large-scale randomized controlled trials with longer follow-up are needed to confirm their long-term effects on glycemic control and diabetes-related outcomes.

Keywords: diabetes self-management; group-based intervention; health belief model; self-care; systematic review; type 2 diabetes mellitus

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INTRODUCTION

Diabetes mellitus (DM) is one of the leading non-communicable diseases and remains a major public health challenge worldwide. The continuously increasing prevalence of diabetes indicates that it has become a global health problem with substantial impacts on quality of life, productivity, and healthcare expenditures. Type 2 diabetes mellitus (T2DM) is the most common form of diabetes, accounting for more than 90% of all diabetes cases (Yılmaz et al., 2020). According to the International Diabetes Federation (IDF), the number of people living with diabetes continues to rise because of lifestyle changes, urbanization, population aging, and the increasing prevalence of obesity (IDF, 2025). These trends highlight the need for management strategies that extend beyond pharmacological treatment to include sustainable health behavior change.

In Indonesia, T2DM has also become an increasingly serious public health concern. Indonesia is among the countries with the largest number of people living with diabetes, making diabetes control a national health priority (IDF, 2025; Ministry of Health of the Republic of Indonesia, 2024). Most diabetes-related complications can be prevented through optimal glycemic control and consistent adherence to self-care behaviors (American Diabetes Association, 2025).

Self-care among patients with T2DM includes adherence to a healthy diet, regular physical activity, appropriate medication use, routine blood glucose monitoring, and proper foot care. Numerous studies have shown that maintaining adherence to these self-care behaviors remains a major challenge in diabetes management. Many patients struggle to sustain long-term behavioral changes because of low motivation, inadequate risk perception, psychological barriers, limited knowledge, and insufficient social support (Nouri et al., 2024).

One of the most widely applied behavioral theories in health promotion is the Health Belief Model (HBM). This model proposes that individuals are more likely to engage in health-promoting behaviors when they perceive themselves as susceptible to a disease (perceived susceptibility), recognize the seriousness of the disease (perceived severity), believe that the recommended actions provide benefits (perceived benefits), perceive fewer obstacles to performing those actions (perceived barriers), receive cues that encourage action (cues to action), and possess confidence in their ability to perform the behavior (self-efficacy). Among patients with T2DM, these constructs play a crucial role in determining the successful implementation of self-care behaviors (Park et al., 2025).

Several studies have demonstrated that HBM-based interventions can improve various health behaviors among patients with T2DM. A randomized controlled trial reported that health literacy education developed based on HBM constructs significantly improved self-efficacy, perceived susceptibility, and perceived benefits while reducing perceived barriers among individuals with T2DM. However, no significant difference in glycated hemoglobin (HbA1c) was observed during the relatively short follow-up period (Ağralı & Akyolcu, 2022). These findings suggest that changes in health beliefs may represent an essential preliminary step toward achieving sustained behavioral change.

Other studies have also shown that HBM-based diabetes self-management programs improve health beliefs, self-care behaviors, and quality of life among patients with T2DM (Afniratri et al., 2024). Furthermore, HBM-based health coaching has been reported to improve quality of life while reducing fasting blood glucose levels compared with control groups (Zare et al., 2020). These findings reinforce the role of the HBM not only as a conceptual framework for understanding health behavior but also as a theoretical foundation for developing effective educational interventions.

In clinical practice, HBM-based interventions are commonly delivered using a group-based approach. Group interventions provide opportunities for participants to share experiences, discuss barriers, receive peer support, and strengthen their motivation to adopt healthy behaviors. Interactions among participants may also enhance cues to action and self-efficacy through social learning processes (Darvishi et al., 2025). Compared with individual education, group-based interventions are more cost-effective and can be more easily integrated into primary healthcare services.

Nevertheless, evidence regarding the effectiveness of HBM-based interventions in promoting behavioral change among patients with T2DM remains inconsistent. While several studies have reported significant improvements in self-care behaviors, medication adherence, physical activity, and quality of life, others have found that clinical outcomes, particularly HbA1c, did not improve significantly (Ağralı & Akyolcu, 2022). These inconsistencies may be attributed to differences in participant characteristics, intervention duration, educational intensity, delivery methods, and outcome measures.

In addition, observational studies have identified self-efficacy, perceived susceptibility, and perceived severity as significant predictors of self-care behaviors, whereas perceived barriers are negatively associated with patients' adherence to diabetes self-management (Darvishi et al., 2025).

These findings further support the theoretical premise that modifying health beliefs can lead to meaningful behavioral change.

To date, evidence regarding the effectiveness of group-based HBM interventions remains dispersed across various study designs, including randomized controlled trials, quasi-experimental studies, and other intervention studies. The diversity of research designs and outcome measures makes it difficult to draw comprehensive conclusions regarding the effectiveness of these interventions. Therefore, a systematic review is needed to identify, critically appraise, and synthesize the most recent evidence on the effectiveness of group-based Health Belief Model interventions in promoting behavioral change among patients with type 2 diabetes mellitus.. Therefore, this systematic review aimed to synthesize the current evidence on the effectiveness of group-based Health Belief Model interventions in improving self-care behaviors among patients with type 2 diabetes mellitus.

METHOD

This study employed a systematic review design following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure a systematic and transparent process of study identification, selection, and reporting.

Literature Search

A comprehensive literature search was conducted using three electronic databases: PubMed, Scopus, and Google Scholar. The search aimed to identify studies evaluating the effectiveness of Health Belief Model (HBM)-based interventions in promoting behavioral change among patients with type 2 diabetes mellitus (T2DM). Eligible articles were limited to those published between 2021 and 2026 to ensure that the review included the most recent evidence. Google Scholar was used as a supplementary database to maximize the comprehensiveness of the literature search in addition to the major bibliographic databases.

Search Strategy

The search strategy was developed using combinations of keywords and Boolean operators (AND and OR), with syntax adapted to the indexing requirements of each database. The primary search terms included: ("Type 2 Diabetes Mellitus" OR "T2DM") AND ("Health Belief Model" OR "HBM") AND ("Group-based intervention" OR "Group education" OR "Group counseling") AND ("Behavior change" OR "Self-care" OR "Self-management" OR "Medication adherence" OR "Health behavior"). The search syntax was modified for each database while maintaining the same conceptual meaning of the search terms.

Eligibility Criteria

Studies were included if they were published between 2021 and 2026 in English or Indonesian, employed randomized controlled trial, quasi-experimental, controlled trial, or pretest–posttest intervention designs, involved adults (≥ 18 years) with type 2 diabetes mellitus, evaluated group-based interventions based on the Health Belief Model (HBM), reported behavioral outcomes such as self-care, self-management, medication adherence, dietary adherence, physical activity, or blood glucose monitoring, and were available in full text. Studies were excluded if they were systematic reviews, meta-analyses, editorials, letters, conference abstracts, or study protocols, did not use the HBM as the intervention framework, evaluated only individual-based interventions, failed to report behavioral outcomes, were duplicate publications, or had inaccessible full-text articles.

Study Selection

All retrieved records were exported into reference management software to identify and remove duplicate articles. Titles and abstracts were then screened according to the predefined eligibility criteria. Studies that met the inclusion criteria proceeded to full-text assessment. The study selection

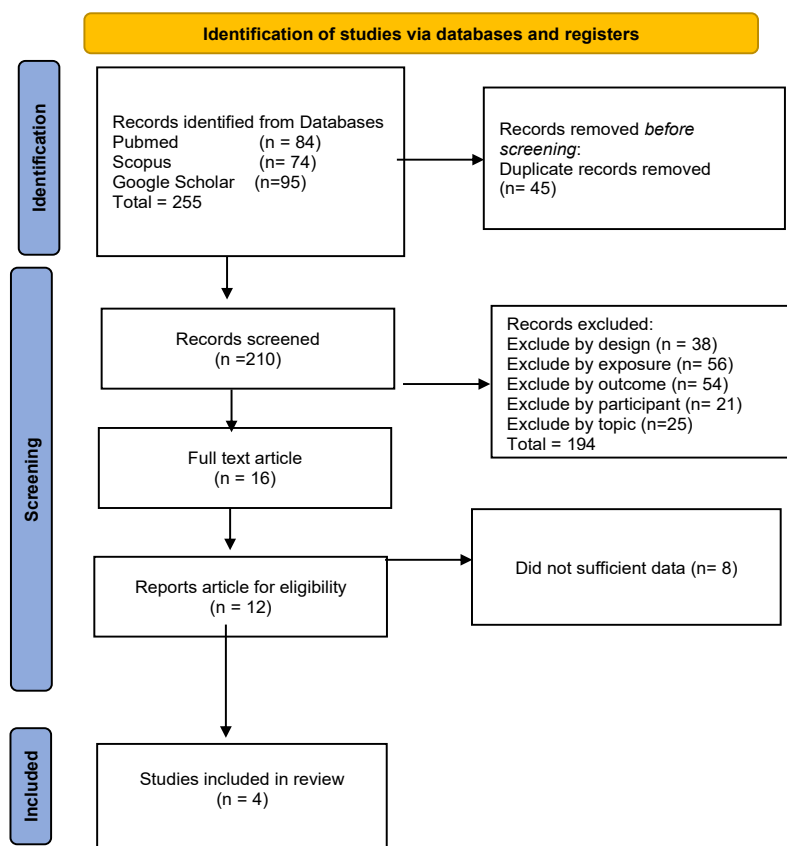
process was documented using the PRISMA 2020 flow diagram, including the stages of identification, screening, eligibility assessment, and final inclusion.

Data Extraction

Data were extracted using a standardized extraction form that included the following information: first author, publication year, country, study design, sample characteristics, type of HBM-based intervention, intervention duration, outcome measures, research instruments, and the main findings related to behavioral changes among patients with type 2 diabetes mellitus.

Quality Assessment

The methodological quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, with the appropriate checklist selected according to the study design (randomized controlled trial or quasi-experimental study). Quality assessment was performed to identify potential sources of bias and determine the methodological rigor of each study before data synthesis.



Picture 1. Prisma

Tabel 1.

Quality Assessment

No	Writer	Design	JBI Instruments	Yes	No	Unclear	Score	Quality
1	Ağralı & Akyolcu (2022)	RCT	JBI Checklist for RCTs (13 items)	12	0	1	12/13 (92.3%)	High
2	Nouri et al. (2024)	RCT	JBI Checklist for RCTs (13 items)	13	0	0	13/13 (100%)	High
3	Mohammadi et al. (2024)	Quasi-experimental	JBI Checklist for Quasi-Experimental (9 items)	8	0	1	8/9 (88.9%)	High
4	Afniratri et al. (2024)*	Meta-analysis	JBI Checklist for Systematic Reviews	11	0	0	11/11 (100%)	High

RESULT

Table 2.
Analisy Article

No	Author (Year)	Title	Objective	Method	Instrume nt	Populat ion	Results
1	Ağralı & Akyolcu (2022)	The Effect of Health Literacy-Based, Health Belief Model-Constructed Education on Glycated Hemoglobin (HbA1c) in People with Type 2 Diabetes: A Randomized Controlled Study	Assessing the effectiveness of HBM-based education on health literacy, HBM constructs, and HbA1c in type 2 DM patients.	Randomized Controlled Trial	Health Literacy Question naire, HBM Scale, HbA1c	168 adult patients with type 2 diabetes	HBM-based education increased self-efficacy, perceived benefits, perceived susceptibility, and decreased perceived barriers. HbA1c decreased but did not differ significantly between groups.
2	Afniratri, Tamtom o, & Murti (2024)	Meta-analysis: Effectiveness of Health Belief Model-Based Health Education in Patients with Type 2 Diabetes Mellitus	Analyzing the effectiveness of HBM-based health education in type 2 DM patients.	Meta-analysi s	PRISMA, JBI Critical Appraisal	12 intervention studies	HBM-based health education improves patient self-care and compliance.
3	Nouri, Nazari, Kaveh, & Hosseini (2024)	Effectiveness of a Health Belief Model-Based Educational Intervention on Medication Adherence among Patients with Type 2 Diabetes: Insights from a Randomized Controlled Trial in Iran	To determine the effectiveness of HBM-based group education on medication adherence in type 2 DM patients.	Randomized Controlled Trial	HBM Question naire, Medication Adherence Question naire, HbA1c	120 adult patients with type 2 diabetes mellitus	The intervention significantly increased medication adherence, self-efficacy, perceived benefits, and reduced perceived barriers compared to the control group.
4	Moham madi et al. (2024)	Effectiveness of an Educational Intervention via Health Belief Model in Promoting Self-Care Behavior in Type II Diabetes Mellitus Patients	Evaluating the effectiveness of HBM-based education on self-care behavior of type 2 DM patients.	Quasi-experi mental	HBM Question naire, Diabetes Self-Care Question naire	84 adult patients with type 2 diabetes mellitus	HBM-based education significantly improved dietary adherence, physical activity, medication use, and blood glucose monitoring.
No	Penulis (Tahun)	Judul	Tujuan	Metode	Instrume n	Popula si	Hasil
1	Ağralı & Akyolcu (2022)	The Effect of Health Literacy-Based, Health Belief Model-Constructed Education on Glycated Hemoglobin (HbA1c) in People with Type 2 Diabetes: A Randomized Controlled Study	Menilai efektivitas edukasi berbasis HBM terhadap literasi kesehatan, konstruk HBM, dan HbA1c pada pasien DM tipe 2.	Randomized Controlled Trial	Health Literacy Question naire, HBM Scale, HbA1c	168 pasien dewasa DM tipe 2	Edukasi berbasis HBM meningkatkan self-efficacy, perceived benefits, perceived susceptibility, serta menurunkan perceived barriers. HbA1c menurun tetapi tidak berbeda signifikan antar kelompok.

2	Afniratri, Tamtom, & Murti (2024)	Meta-analysis: Effectiveness of Health Belief Model-Based Health Education in Patients with Type 2 Diabetes Mellitus	Menganalisis efektivitas pendidikan kesehatan berbasis HBM pada pasien DM tipe 2.	Meta-analyses	PRISMA, JBI Critical Appraisal	12 peneliti dan intervensi	Pendidikan kesehatan berbasis HBM meningkatkan self-care dan kepatuhan pasien.
3	Nouri, Nazari, Kaveh, & Hosseini (2024)	Effectiveness of a Health Belief Model-Based Educational Intervention on Medication Adherence among Patients with Type 2 Diabetes: Insights from a Randomized Controlled Trial in Iran	Mengetahui efektivitas edukasi kelompok berbasis HBM terhadap kepatuhan pengobatan pasien DM tipe 2.	Randomized Controlled Trial	HBM Questionnaire, Medication Adherence Questionnaire, HbA1c	120 pasien dewasa DM tipe 2	Intervensi meningkatkan kepatuhan pengobatan, self-efficacy, perceived benefits, dan menurunkan perceived barriers secara signifikan dibandingkan kelompok kontrol.
4	Mohammedi et al. (2024)	Effectiveness of an Educational Intervention via Health Belief Model in Promoting Self-Care Behavior in Type II Diabetes Mellitus Patients	Mengevaluasi efektivitas edukasi berbasis HBM terhadap perilaku self-care pasien DM tipe 2.	Quasi-experimental	HBM Questionnaire, Diabetes Self-Care Questionnaire	84 pasien dewasa DM tipe 2	Edukasi berbasis HBM meningkatkan kepatuhan diet, aktivitas fisik, penggunaan obat, dan pemantauan glukosa darah secara signifikan.

DISCUSSION

The findings of this systematic review demonstrate that group-based Health Belief Model (HBM) interventions consistently promote positive behavioral changes among patients with type 2 diabetes mellitus (T2DM). Although the intervention formats, durations, and outcome measures varied across the included studies, all primary studies reported improvements in health-related behaviors, particularly self-care, medication adherence, physical activity, dietary adherence, and blood glucose monitoring. In addition, significant improvements were observed in key HBM constructs, including self-efficacy, perceived benefits, and perceived susceptibility, accompanied by reductions in perceived barriers. These findings suggest that the HBM provides an effective theoretical framework for facilitating health behavior change by modifying individuals' health beliefs and perceptions.

The randomized controlled trial conducted by Ağralı and Akyolcu (2022) demonstrated that HBM-based education integrated with health literacy significantly improved self-efficacy, perceived benefits, and perceived susceptibility while reducing perceived barriers. However, despite these behavioral improvements, no significant difference in glycated hemoglobin (HbA1c) was observed between the intervention and control groups. This finding suggests that changes in health beliefs and self-management behaviors may occur earlier than measurable improvements in clinical outcomes. Since HbA1c reflects average blood glucose levels over approximately three months, a longer intervention period and follow-up may be necessary to achieve clinically meaningful metabolic improvements.

Similarly, Nouri et al. (2024) reported that group-based HBM education significantly improved medication adherence while strengthening important HBM constructs, particularly self-efficacy and perceived benefits. These findings indicate that patients who recognize the benefits of treatment, understand the risks of diabetes-related complications, and have confidence in their ability to manage the disease are more likely to maintain long-term adherence to prescribed therapies. In the

context of T2DM, medication adherence is a fundamental component of diabetes self-management and plays a critical role in preventing long-term complications.

Furthermore, the quasi-experimental study by Mohammadi et al. (2024) demonstrated that HBM-based educational interventions improved not only medication adherence but also dietary behaviors, physical activity, and blood glucose monitoring. These findings suggest that the HBM can simultaneously influence multiple dimensions of diabetes self-care because these behaviors are driven by individuals' perceptions of disease susceptibility, perceived benefits of treatment, perceived barriers, and confidence in their ability to perform recommended health behaviors. Similar findings have been reported by Polsook et al. (2024), who concluded that theory-based self-management interventions produce significant improvements across multiple domains of diabetes self-management.

Overall, the findings of this systematic review support the theoretical assumptions of the Health Belief Model, which proposes that health behavior is influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Ağralı & Akyolcu, 2022; Darvishi et al., 2025; Park et al., 2025). Group-based interventions offer opportunities for participants to exchange experiences, discuss challenges, receive peer support, and learn from one another through social interaction. These processes enhance motivation, strengthen self-efficacy, and reinforce behavioral intentions, thereby facilitating more sustainable behavioral changes than individual education alone (Afniratri et al., 2024; Zare et al., 2020; Darvishi et al., 2025). Nevertheless, this review also indicates that behavioral outcomes improved more consistently than clinical outcomes. While most studies demonstrated significant improvements in self-care behaviors, the effects on HbA1c were less consistent. This discrepancy may be explained by relatively short intervention durations, differences in educational intensity, variations in sample size, and limited follow-up periods (Ağralı & Akyolcu, 2022; Park et al., 2025).

Therefore, future studies should employ longer intervention and follow-up periods to determine whether improvements in health behaviors can be translated into sustained glycemic control and reductions in diabetes-related complications. The findings of this review have important implications for nursing practice. Nurses play a central role as educators in supporting diabetes self-management and are well positioned to implement group-based HBM educational programs as part of Diabetes Self-Management Education (DSME). Such interventions are relatively inexpensive, feasible to implement in both primary healthcare and hospital settings, and have the potential to improve patients' long-term adherence to self-care behaviors (American Diabetes Association, 2025; Park et al., 2025). Consequently, integrating HBM constructs into structured group education programs may represent an effective strategy for enhancing diabetes management and improving health outcomes among individuals with T2DM (Afniratri et al., 2024; Darvishi et al., 2025).

CONCLUSION

This systematic review demonstrates that group-based Health Belief Model (HBM) interventions are effective in promoting behavioral change among patients with type 2 diabetes mellitus. These interventions consistently improve self-care behaviors, medication adherence, dietary compliance, physical activity, blood glucose monitoring, and key HBM constructs, including self-efficacy, perceived susceptibility, and perceived benefits, while reducing perceived barriers. However, improvements in clinical outcomes, particularly glycated hemoglobin (HbA1c), remain inconsistent, likely because of the relatively short intervention duration and follow-up periods. These findings suggest that group-based HBM interventions represent an effective educational strategy for strengthening diabetes self-management and can be integrated into Diabetes Self-Management Education (DSME) programs in both primary healthcare and hospital settings.

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