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Effectiveness of self-management intervention in community on management of type 2 diabetes mellitus: a systematic review

Efektivitas Intervensi Self-Management di Komunitas terhadap Manajemen Diabetes Melitus Tipe 2: a Systematic Review

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ABSTRACT

Background: *The rising global prevalence of type 2 diabetes mellitus (T2DM) highlights the urgent need for sustainable management strategies, such as community-based self-management interventions.*
Objective: *This systematic review aimed to evaluate the effectiveness of these interventions on diabetes control and quality of life among adults with T2DM.*
Methods: *Following PRISMA 2020 guidelines, seven Randomized Controlled Trials (RCTs) published between 2020 and 2024 were analyzed. These studies included 1,193 participants from diverse countries like the United States, Ghana, China, Nepal, and Taiwan. The interventions tested included digital education, programs led by community health workers (CHWs), and community-based cooking programs.*
Results: *Most studies reported improvements in HbA1c, self-care behaviors, and quality of life. The effectiveness varied depending on intervention duration, sample size, and socio-cultural context. Multicomponent interventions that combined education, social support, and community health worker (CHW) engagement produced the most consistent and positive outcomes.*
Conclusion: *Although these interventions show promise in improving glycemic control, self-care behaviors, and quality of life, the limited number of studies, heterogeneity of interventions, and methodological biases restrict the overall strength of the evidence. Therefore, further long-term randomized controlled trials (RCTs) in diverse settings, as well as cost-effectiveness evaluations, are needed before large-scale implementation.*

Keywords: *community-based intervention, glycemic control, quality of life, self-management, type 2 diabetes mellitus*

ABSTRAK

Background: Prevalensi diabetes melitus tipe 2 (T2DM) yang terus meningkat secara global menunjukkan pentingnya strategi manajemen berkelanjutan, salah satunya melalui intervensi manajemen mandiri berbasis komunitas.
Tujuan: Tinjauan sistematis ini bertujuan mengevaluasi efektivitas intervensi tersebut dalam mengontrol diabetes dan meningkatkan kualitas hidup pada orang dewasa dengan T2DM.
Metode: Dengan mengikuti pedoman PRISMA 2020, tujuh Randomized Controlled Trials (RCTs) yang diterbitkan antara tahun 2020-2024 dianalisis. Studi-studi ini melibatkan 1.193 partisipan dari berbagai negara, seperti Amerika Serikat, Ghana, Tiongkok, Nepal, dan Taiwan. Intervensi yang diuji meliputi edukasi digital, program yang dipimpin oleh community health workers (CHWs), dan program memasak berbasis komunitas.

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Hasil: Sebagian besar studi menunjukkan adanya peningkatan pada HbA1c, perilaku perawatan diri, dan kualitas hidup. Efektivitas intervensi bervariasi tergantung pada durasi intervensi, ukuran sampel, dan konteks sosial budaya. Intervensi multikomponen yang menggabungkan edukasi, dukungan sosial, dan keterlibatan kader kesehatan (CHW) menghasilkan luaran yang paling konsisten dan positif.
Kesimpulan: Meskipun intervensi ini menjanjikan dalam meningkatkan kontrol glikemik, perilaku perawatan diri, dan kualitas hidup, keterbatasan jumlah studi, heterogenitas intervensi, serta bias metodologis membatasi kekuatan bukti secara keseluruhan. Oleh karena itu, diperlukan uji coba terkontrol acak (RCT) jangka panjang di berbagai setting, serta evaluasi cost-effectiveness sebelum implementasi dalam skala luas.

Kata kunci: diabetes melitus tipe 2, intervensi berbasis komunitas, kendali glikemik, kualitas hidup, manajemen mandiri

INTRODUCTION

As one of the fastest-growing non-communicable diseases, diabetes mellitus now poses a serious threat to the global health system. The number of people with diabetes worldwide was recorded at approximately 537 million in 2021 and is expected to rise to 783 million by 2045.[1] The number of incidents in East Asia also showed a significant increase, as reflected in China, where the overall prevalence of diabetes reached 12.4% and the prevalence of prediabetes was recorded at 38.1%.[2]

The prevalence of diabetes in Indonesia has shown a significant increase. In 2020, the prevalence was recorded at 9.19%, or approximately 18.69 million cases. This is projected to increase to 16.09% by 2045, with a total of 40.7 million cases.[3] This increase is influenced by poor diet, lack of physical activity, as well as hereditary factors and increasing age.[4] The impact of the increasing prevalence of diabetes mellitus requires effective management strategies, one of which is through a community-based self-management approach.

Self-management refers to an individual's ability to manage their health condition independently, including decision-making, implementing self-care strategies, and lifestyle changes to improve quality of life.[5] One program that has proven effective is diabetes self-management education and support. This program aims to improve patients' skills in managing their condition through an approach that includes health education, lifestyle changes, and regular blood glucose monitoring.[6] The research results indicate that high health literacy is closely related to successful self-management of diabetes, higher self-efficacy, and the ability to maintain HbA1c levels within normal limits.[7,8,9] Community-based approaches have great significance in the management of chronic diseases, as they allow for broader reach, can be adapted to local cultures, and strengthen ongoing social support.[10]

In addition to improving glycemic control, interventions*self-management*Community-based support also provide significant psychosocial benefits. Adequate social support can reduce disease-related anxiety, increase self-efficacy in managing the condition, and improve the quality of life for diabetes patients.[11] However, research findings on the effectiveness of community-based approaches have been mixed. Self-management interventions have had no significant impact on perceptions of diabetes self-management in rural African-American communities.[12]

On the other hand, the activity self-management group-based interventions can provide short-term effects in controlling body mass index(BMI) and long-term effects in controlling blood sugar levels, fasting plasma glucose(FPG) and triglycerides (TG) in type 2 diabetes patients.[13] Community-based programs that integrate diet, physical activity, and health behavior changes have shown positive results in the management of Type 2 Diabetes Mellitus. Various intervention models, such as group support, digital

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technology, and health education, need to be studied more deeply to understand their effectiveness in various settings.[14]

Given the mixed results of primary studies, with some reporting significant effects while others do not, a systematic review is needed to synthesize current findings, assess the consistency of effectiveness of community-based interventions, and identify intervention features (e.g., components, duration, intensity) associated with clinical outcomes in T2DM. This systematic review was conducted to evaluate the effectiveness of self-management programs implemented at the community level in improving diabetes control, particularly for T2DM.

METHODS

Study design

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The study aimed to synthesize evidence on community-based self-management interventions for type 2 diabetes mellitus.

Search strategy

To obtain relevant literature, the authors conducted a systematic search of four international databases (PubMed, Scopus, SAGE Journals, and ScienceDirect). The search string was developed from key keywords related to intervention, population, and context, then combined using Boolean operators (AND, OR), structured as follows:

("Self management"[MeSH Terms] OR "Peer Support"[MeSH Terms] OR "Community-Based Participatory Research"[MeSH Terms]) AND ("Diabetes Mellitus, Type 2"[MeSH Terms]) AND ("Community Health Services"[MeSH Terms] OR "Public Health"[MeSH Terms]). The search focused on articles published during the last five years, namely from 2020 to 2024. Only English-language articles were included.

Eligibility criteria

Inclusion criteria for this systematic review included articles published in the last five years (2020–2024) and written in English. Included studies must have used a randomized controlled trial (RCT) design and specifically examined community-based self-management interventions in the context of diabetes mellitus management. Furthermore, only studies involving adult populations, regardless of gender, were considered.

Exclusion criteria included opinion articles, editorials, or commentaries, as well as studies that were systematic literature reviews or meta-analyses. Articles published more than five years prior to the review were also excluded. Studies involving inappropriate populations (i.e., those not suffering from diabetes mellitus) and studies examining interventions outside the community context were also excluded from the analysis.

Study selection process

The study selection process followed the PRISMA 2020 flow. An initial search of four major databases identified a total of 146 publications. An initial exclusion of 14 articles was performed for not meeting the inclusion criteria. Screening of the remaining 132 publications by title and abstract eliminated 92 irrelevant articles, leaving 37 for full-text evaluation.

Twenty-six articles from this group were excluded for not meeting the population or location criteria, leaving 11 for in-depth assessment. In the final stage, four articles were excluded (one mixed methods study and three protocol studies). Thus, a total of seven articles were included in this systematic review. The process is illustrated in Figure 1 (PRISMA 2020 Flow Diagram).

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Data extraction

Data extraction was conducted systematically from the selected studies. The extracted data included author names, year of publication, study design, sample characteristics, intervention type, and key findings related to community-based self-management interventions for type 2 diabetes mellitus.

Quality assessment / Risk of bias

To assess the methodological quality and potential risk of bias of the included studies, an evaluation was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Randomized Controlled Trials. Risk of bias was categorized as low, moderate, or high based on the number of criteria met, with reference to the JBI Reviewer's Checklist guidelines.[15]

Data synthesis / Data analysis

The data were synthesized descriptively by summarizing key findings across studies, focusing on patterns, variations, and the effectiveness of community-based self-management interventions in type 2 diabetes mellitus management.

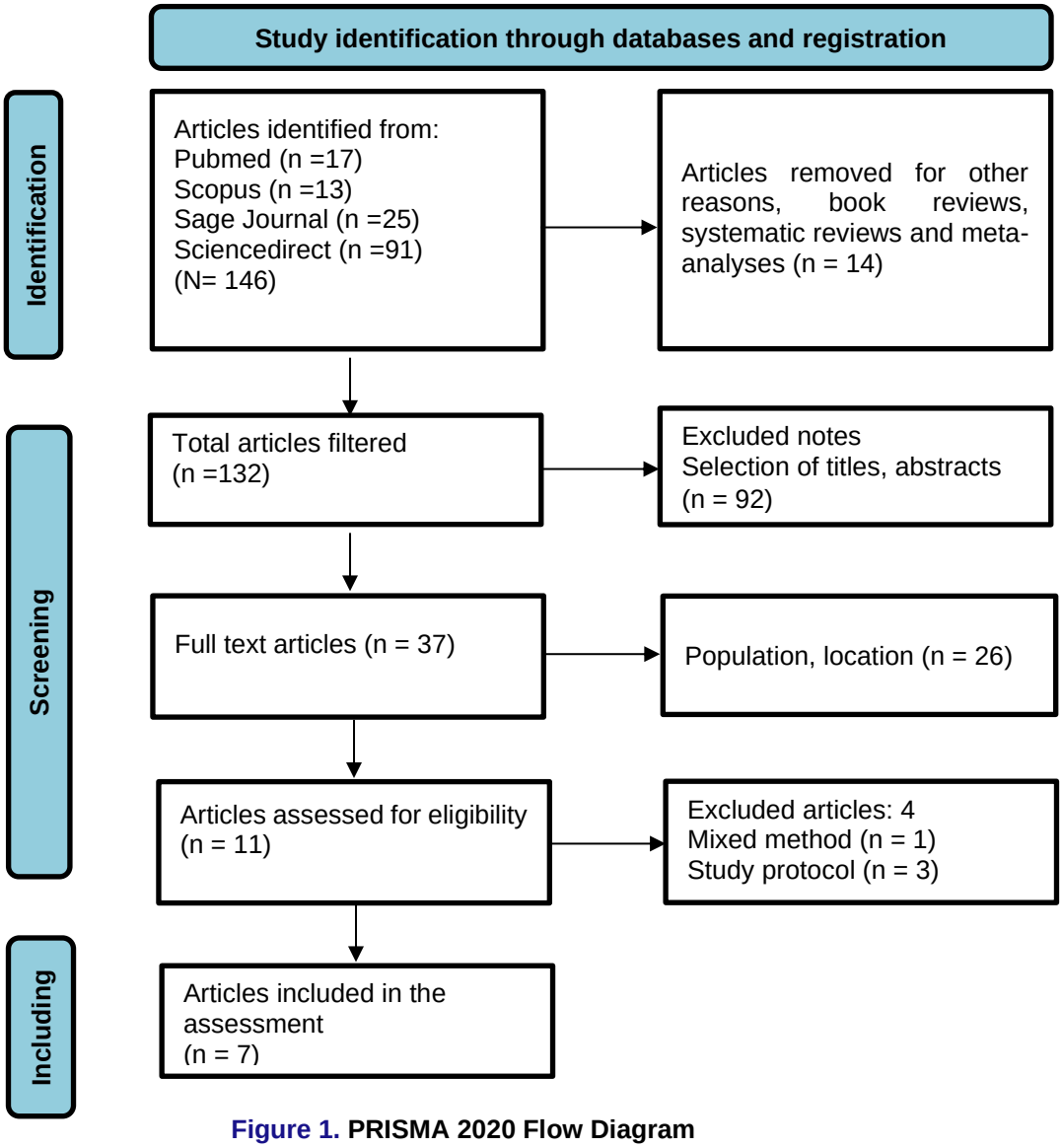

Figure 1. PRISMA 2020 Flow Diagram

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RESULTS

Seven RCTs with a total of 1,193 participants from the United States, Ghana, China, Nepal, and Taiwan were analyzed. The interventions studied included digital education, community health worker-based support programs, periodontal treatment, and community-based cooking programs. Most studies reported significant improvements in glycemic control, self-care behaviors, and quality of life. However, results were not consistent; for example, Asante et al. (2024) reported a greater reduction in HbA1c in the intervention group, but this was not statistically significant (p=0.272) (Table 1).

Table 1. Characteristics and Main Findings of Included Studies

Research Title and Year	Design	Samples and Sampling	Intervention	Research Instruments	Results
Health Literacy and Outcomes of a Community - Based Self-Help Intervention: A Case of Korean Americans With Type 2 Diabetes Kim et al. (2020)[11]	RCT	N = 250 (120 intervention, 130 control); random sampling	*Community-based self-help program*	● DKQ ● SDSCA ● REALM ● DM-REALM ● TOFHLA, NVS	High health literacy was associated with better DM management (p < 0.001); instrumental correlations were significant (r = 0.91; r = 0.68; r = 0.47).
Nurse-Led Mobile Phone Intervention to Promote Self management in Type 2 Diabetes in Ghana Asante et al. (2024)[16]	RCT	N = 98 (49 intervention, 49 control); random sampling	*Nurse-led mobile phone self-management*	● ROCHE COBAS ● self-reported questionnaire ● SDSCA	HbA1c decreased more (− 0.98% vs − 0.48%) but not significantly (p= 0.272); self-management scores were higher with p> 0.05.
The effectiveness of a community-based online low-glycaemic index diet and lifestyle recommendations intervention for people with type 2 diabetes Chen et al. (2025)[17]	RCT	N = 178 (89 intervention, 89 control); random sampling	*Online low-GI diet & lifestyle education*	● DSQL ● HbA1c ● BMI, lipid ● profile	HbA1c decreased significantly (p= 0.001); BMI & LDL – C decreased (p < 0.001; HDL increased (p = 0.001); (p < 0.001).
The Effect of a Community-Based Health Behaviour Intervention on Healthcare Services Use Among People with Type 2 Diabetes (Paudel et al. (2025)[18]	Cluster RCT	N = 481, aged 30–70 years; 15 intervention clusters vs. 15 controls	*Community-based health behavior program*	● DSQL ● health service data	Health care utilization increased in highly engaged participants (AOR 1.16; 95% CI: 1.05 - 1.28; p = 0.004); the primary outcome was not significant in the overall population.
Preparing Community Health Workers to Empower Latino(a)s With Diabetes: A Real-World Implementation Study Porterfield et al. (2024)[19]	Clinical trial (without control)	N = 70 Latino(a); purposive sampling	*Bilingual CHW-led diabetes curriculum*	● Satisfaction survey ● QoL	Satisfaction 3.8/4.0; QoL 9.7/10; attendance 81.6%; 87.1% of participants wanted the program to continue.

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Research Title and Year	Design	Samples and Sampling	Intervention	Research Instruments	Results
Clinical Outcomes and Oral Health-Related Quality of Life after Periodontal Treatment with Community Health Worker Strategy in Patients with Type 2 Diabetes Hsu et al. (2021)[20]	RCT	N = 68 (35 intervention, 33 control); random sampling	*Periodontal + CHW support*	● DSMQ ● HbA1c ● OHQoL	Significant periodontal improvement ($p < 0.01$); OHQoL improved ($p < 0.05$); 62% of intervention patients vs 38% of controls experienced improvement.
Outcomes of Cooking Matters for Diabetes: A 6-week Randomized, Controlled Cooking and Diabetes Self-management Education Intervention Williams et al. (2023)[21]	Waitlist-controlled RCT	N = 48 (30 intervention, 18 control); random sampling	*Cooking Matters for Diabetes*	● SDSCA ● DSMQ ● DTSQ ● SF-36 ● HbA1c	Healthier diet ($p = 0.015–0.05$); increased mental QoL ($p = 0.025$); increased vegetable consumption ($p = 0.023$).

DISCUSSION

This systematic review evaluated seven studies with a total of 1,193 participants from five countries. In general, community-based self-management interventions can improve glycemic control, self-care behavior, and quality of life of patients. T2DM. Most studies show significant improvements, particularly in HbA1c, self-management behavior scores, and psychosocial aspects. However, results are not entirely consistent, for example, in the study by Asante et al. (2024).[16] in Ghana found greater reductions in HbA1c in the intervention group than in the control group, but the difference was not statistically significant. This confirms that the effectiveness of community-based interventions is still influenced by various contextual factors.

The interventions analyzed were diverse, reflecting a multidimensional approach to type 2 diabetes management. Digital interventions, such as online education based on a low glycemic index diet, were used by Chen et al. (2025), [17]and education via telephone,[16] showing potential for improved metabolic control, although not always significant. Community health worker-based programs are also effective, both through bilingual education,[19] and oral care assistance,[20] which improves the quality of life. Practical activities such as cooking training improve eating patterns. Williams et al. (2023),[21] while interventions in Nepal emphasized the importance of participant involvement in improving the utilization of health services.[18] Overall, community interventions target multiple aspects of diabetes management, both clinical and non-clinical.

The inconsistency in findings across studies may be attributed to several key factors. One important factor is the variation in intervention duration, which ranges from short-term programs lasting six weeks, as reported by Williams et al. (2023), to interventions conducted over several months. This variation may influence the magnitude of the observed effects.[21] Second, differences in sample size impact statistical power; studies with limited participants risk being underpowered, making it difficult to detect significance. Third, sociocultural context plays a role, such as the positive reception of CHW-based bilingual interventions in Latino communities in the US compared to telephone-based interventions in Ghana, which are hampered by limited infrastructure and health literacy.

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Consistent with recent meta-analyses, duration and family support are important determinants of the effectiveness of diabetes self-management.[22] Thus, the success of community intervention is not only determined by the intervention model, but also by its suitability to the characteristics and needs of the target population.

The methodological quality of the included studies varied. Some reported randomization, but rarely explained the allocation concealment. Some studies, such as Porterfield et al. (2024),[19] without a control group, are prone to bias; while the sample size is small in Williams et al. (2023)[21] and Hsu et al. (2021),[20] limiting the power of the analysis. The short follow-up duration (<3 months) also makes it difficult to assess long-term effects. Furthermore, differences in instruments (SDSCA, DSMQ, DSQL) hinder direct comparisons. These limitations align with previous meta-analyses that have highlighted similar issues, including small sample sizes, varying durations, and instrument heterogeneity.[23–25]

The findings of these seven studies are consistent with meta-analyses and systematic reviews showing that community-based interventions can reduce HbA1c by between -0.2 and 0.6% in the first six months. For example, a meta-analysis by Tang et al. (2025) reported a reduction of -0.41 to -0.63% in six months for interventions based on the PRECEDE-PROCEED model,[26] and other studies reviewing community-based interventions in patients with DMT2 found a decrease in mean HbA1cby − 0.25%.[27]These findings confirm that, despite relatively small effect sizes, community interventions consistently contribute to improvements in glycemic control.

The practical implication of this study's findings is that community-based self-management interventions can be integrated into primary care programs as a promotive and preventive strategy. Evidence from recent systematic reviews and trials indicates that community health workers (CHWs) are effective in improving glycemic control. Self-care habits and their impact on patients' quality of life DMT2.[26.27] Multicomponent programs, combining health education with social support, show more consistent results. In developing countries, including Indonesia, CHWs can be optimized as facilitators, supported by simple digital technology and adapted educational content based on local culture.

CONCLUSION

Community-based self-management interventions have the potential to improve glycemic control, self-care adherence, and quality of life for patients with type 2 diabetes, particularly when using a multicomponent approach that combines digital education, group support, or facilitation by community health workers with cultural adaptation and adequate interaction duration. However, limitations of this review include the limited number of studies, heterogeneity of interventions and instruments, and the focus on English-language RCTs from 2020–2024. Further research with longer-term designs, contexts in Low- and Middle-Income Countries (LMICs), and cost-benefit evaluations are needed before wide-scale implementation.

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