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Occupational Therapy-Based Health Management Program for Glycemic Control in Type 2 Diabetes Mellitus

Program Pengurusan Kesihatan Berasaskan Terapi Cara Kerja untuk Kawalan Glisemik dalam Diabetes Mellitus Jenis 2

ANIEK PUSPITOSARI[1*], NINIK NURHIDAYAH[1]

[1]Politeknik Kesehatan Kementerian Kesehatan Surakarta, Letjen Sutoyo Street Mojosongo, Surakarta Central Java 57127, Indonesia

*Corresponding author; email: aniekpuspitosari@gmail.com

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ABSTRACT

This community-based study aimed to evaluate the effect of an Occupational Therapy-Based Health Management Program on random blood glucose levels among individuals with type 2 diabetes mellitus. A pre-experimental one-group pretest–posttest design was used, involving 40 participants in Kemiri Village, Karanganyar Regency, Central Java, Indonesia. The intervention consisted of eight face-to-face sessions conducted twice weekly during July 2023, with each session lasting 30–45 minutes, followed by a 30-day home-based self-management program conducted in August 2023. The intervention included structured health education, dietary modification, physical activity promotion, medication adherence support, blood glucose monitoring, and home-based self-management practice. Random blood glucose levels were measured before and after completion of the intervention. The mean baseline random blood glucose level was 283.13 ± 36.10 mg/dL and decreased to 218.25 ± 30.37 mg/dL after the intervention, representing a mean reduction of 64.88 mg/dL. A paired-samples t-test demonstrated a statistically significant difference between pretest and posttest measurements ($p < 0.001$), with a very large standardized effect (Cohen's $d = 8.23$). These findings provide preliminary evidence that the community-based Occupational Therapy-Based Health Management Program was associated with improved short-term random blood glucose levels among individuals with type 2 diabetes mellitus. However, the post-intervention blood glucose level remained elevated, and the findings should not be interpreted as evidence of sustained long-term glycemic control. The integration of health education, behavioral practice, and home-based self-management may provide a complementary approach to supporting diabetes management within everyday routines.

Keywords: Community-based intervention, health management, occupational therapy, random blood glucose, type 2 diabetes mellitus

ABSTRAK

Kajian berasaskan komuniti ini bertujuan untuk menilai kesan Program Pengurusan Kesihatan Berasaskan Terapi Cara Kerja terhadap paras glukosa darah rawak dalam kalangan individu dengan diabetes mellitus jenis 2. Kajian pra-eksperimen satu kumpulan ujian pra-ujian pasca telah dijalankan melibatkan 40 peserta di Desa Kemiri, Kabupaten Karanganyar, Jawa Tengah, Indonesia. Intervensi terdiri daripada lapan sesi bersemuka yang dijalankan dua kali seminggu sepanjang bulan Julai 2023, dengan tempoh 30–45 minit bagi setiap sesi, diikuti dengan program pengurusan kendiri di rumah selama 30 hari yang dijalankan pada bulan Ogos 2023. Intervensi merangkumi pendidikan kesihatan berstruktur, pengubahsuaian diet, galakan aktiviti fizikal, sokongan pematuhan ubat, pemantauan glukosa darah, dan latihan pengurusan kendiri di rumah. Paras glukosa darah rawak diukur sebelum dan selepas intervensi selesai. Purata paras glukosa darah rawak sebelum intervensi ialah 283.13 ± 36.10 mg/dL dan menurun kepada 218.25 ± 30.37 mg/dL selepas intervensi, dengan penurunan purata sebanyak 64.88 mg/dL. Analisis ujian-t berpasangan menunjukkan perbezaan yang signifikan secara statistik antara pengukuran sebelum dan selepas intervensi ($p < 0.001$), dengan saiz kesan piawai yang sangat besar (Cohen's $d = 8.23$).

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Dapatan ini memberikan bukti awal bahawa Program Pengurusan Kesihatan Berasaskan Terapi Cara Kerja berasaskan komuniti mempunyai kaitan dengan penurunan paras glukosa darah rawak jangka pendek dalam kalangan individu dengan diabetes mellitus jenis 2. Walau bagaimanapun, paras glukosa darah selepas intervensi masih tinggi dan dapatan ini tidak boleh ditafsirkan sebagai bukti kawalan glisemik jangka panjang yang berterusan. Pendekatan yang mengintegrasikan pendidikan kesihatan, amalan perubahan tingkah laku, dan pengurusan kendiri di rumah berpotensi menjadi pendekatan pelengkap untuk menyokong pengurusan diabetes dalam rutin kehidupan seharian.

Kata Kunci: Diabetes mellitus jenis 2, glukosa darah rawak, intervensi berasaskan komuniti, pengurusan kesihatan, terapi cara kerja

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder that continues to increase globally and remains a major public health challenge (International Diabetes Federation 2025; World Health Organization 2023). The International Diabetes Federation estimates that approximately 589 million adults were living with diabetes in 2025, with the number projected to reach 700 million by 2045 (International Diabetes Federation 2025). This increasing burden is particularly evident in low- and middle-income countries, including Indonesia.

In Indonesia, the prevalence of diabetes among adults reached 11.7% in 2023 (Ministry of Health Republic of Indonesia 2023). A substantial proportion of cases occurs among older adults, reflecting the increasing disease burden associated with ageing (Milita et al. 2021). Diabetes is also associated with long-term complications, including cardiovascular disease, neuropathy, retinopathy, and chronic kidney disease, which contribute to morbidity, functional limitations, and reduced participation in daily activities (International Diabetes Federation 2025; Prathigudupu et al. 2026; Islam et al. 2025; Pinhal et al. 2023).

From an occupational therapy perspective, diabetes management extends beyond glycemic regulation because the condition requires individuals to incorporate multiple health-related behaviors into their everyday occupations and routine (Pyatak et al. 2018). Dietary management, physical activity, medication use, blood glucose monitoring, and other self-management behaviors are performed within the context of daily routines and responsibilities. Occupational therapy therefore emphasizes the development of sustainable routines and habits, adaptation of activities and environments, and engagement in meaningful activities to support participation and independence (Puzhakkal et al. 2025; Powers et al. 2020). Integrating health management behaviors into established daily routines may help individuals translate diabetes self-management recommendations into practical and sustainable everyday activities (Karlsson et al. 2026).

Health management activities, including healthy eating, physical activity, medication adherence, blood glucose monitoring, and risk-reduction behaviors, are recognized as important components of comprehensive diabetes self-management and diabetes self-management education and support (American Diabetes Association Professional Practice Committee 2024; Powers et al. 2020). Current diabetes care recommendations emphasize person-centered approaches that develop individuals' knowledge, skills, confidence, and capacity to integrate self-management behaviors into daily life (American Diabetes Association Professional Practice Committee 2024). This approach is consistent with occupational therapy practice, in which health management is addressed through activity performance, routine development, habit formation, and participation in meaningful occupations.

Although diabetes self-management education and support have been extensively studied, evidence concerning occupational therapy-based health management interventions delivered in community settings remains limited, particularly in rural Indonesian populations. Existing diabetes interventions have predominantly focused on education or clinical management, while fewer studies have examined an occupational therapy-based approach that integrates health management behaviors with everyday routines and home-based practice. This represents an important gap because diabetes self-management is a continuous process that occurs largely outside healthcare facilities and depends on individuals' ability to apply recommended behaviors in their daily lives.

The problem addressed in this study is the need for practical and sustainable community-based approaches that can support individuals with T2DM in integrating health management behaviors into their everyday routines. A structured occupational therapy-based program may provide a complementary approach by combining health education, activity modification, behavioral practice, and home-based self-management within the individual's usual living environment. Such an approach may be particularly relevant in community settings where access to continuous structured diabetes self-management support may be limited.

Therefore, this study aimed to evaluate the effect

of an Occupational Therapy-Based Health Management Program on glycemic control among individuals with T2DM in a community setting. A pre-experimental one-group pretest–posttest design was used, with random blood glucose (RBG) measured before and after a structured intervention comprising

MATERIALS AND METHODS

This pre-experimental study employed a one-group pretest–posttest design to evaluate the effect of an Occupational Therapy-Based Health Management Program on random blood glucose (RBG) levels among individuals with Type 2 Diabetes Mellitus (T2DM). The study was conducted in Kemiri Village, Karanganyar Regency, Central Java, Indonesia, from 11 July to 30 August 2023. The study population comprised 60 individuals diagnosed with T2DM. Following community-based blood glucose screening, 48 individuals met the eligibility criteria. Participants were eligible if they had a physician-confirmed diagnosis of T2DM, were aged ≥18 years, were able to communicate effectively, and provided written informed consent. Eight eligible individuals did not participate because of transportation barriers or work commitments. Consequently, 40 participants were enrolled and completed the study, representing a participation rate of 66.7% of the initial population. A total sampling approach was attempted among the identified population; however, because eight eligible individuals did not participate, the final cohort did not constitute a complete census of the eligible population. The potential implications of non-participation are considered in the limitations of the study.

The Occupational Therapy-Based Health Management Program was implemented in two sequential phases between July and August 2023. The first phase consisted of eight supervised face-to-face sessions conducted during July 2023 at a frequency of two sessions per week, with each session lasting approximately 30–45 minutes. The second phase consisted of a 30-day home-based self-management program conducted during August 2023. The home program commenced after completion of the eighth face-to-face session and was performed independently by participants for 30 consecutive days. The program was facilitated by an occupational therapist and supported by community health cadres and health workers during monitoring of the home-based program.

The intervention was designed to integrate diabetes-related health management behaviors into participants' daily routines through structured education, activity practice, behavioral reinforcement, and home-based application. The eight face-to-face sessions addressed diabetes knowledge and diabetes education, dietary management, physical activity, medication management, and home-based self-management practice. The findings are expected to provide preliminary evidence regarding the feasibility and potential contribution of an occupational therapy-based community intervention to diabetes self-management and glycemic control, while informing future controlled studies and community-based diabetes management practice.complications, healthy eating, medication management, blood glucose monitoring, diabetic foot exercise, walking exercise, stress management, healthy sleep habits, and preparation for independent home-based self-management. The first session focused on diabetes education, including diabetes-related complications and self-management. The second session addressed healthy eating through meal planning and dietary modification. The third session focused on medication management and blood glucose monitoring. The fourth session provided diabetic foot exercise and education on safe physical activity, followed by walking exercise and strategies for incorporating walking into daily activities in the fifth session. The sixth session addressed stress management, healthy sleep habits, and daily routine management. The seventh session focused on reviewing and practicing health-management activities and preparing participants for the home program. The eighth session consisted of evaluation, reinforcement of self-management behaviors, problem solving, and preparation for the 30-day home program. Each session lasted 30–45 minutes.

The program adopted a patient-centered approach by relating health-management recommendations to participants' individual routines, capabilities, preferences, and practical living conditions. Participants were encouraged to identify their usual daily routines, individual barriers to diabetes self-management, and feasible opportunities to incorporate recommended health-management behaviors into everyday activities. The occupational therapist provided education, activity modification, and practical guidance according to participants' identified needs and circumstances. During the home-based phase, participants independently practiced the prescribed health-management activities and documented their implementation using a monitoring logbook. Community health cadres and health workers assisted the occupational therapist in monitoring participants' implementation of the home program and reinforcing the recommended behaviors. This approach was intended to support the integration of diabetes self-management into participants' everyday routines rather than limiting health-management activities to supervised sessions. The primary outcome was random blood glucose (RBG). RBG was measured before the intervention (pretest) and after completion of the 30-day home-based

program (posttest) using standardized measurement procedures performed by trained healthcare personnel. Participant characteristics, including age, sex, duration of diabetes, and diabetes-related complications, were also collected.

Data were analyzed using IBM SPSS Statistics. Descriptive statistics were used to summarize participant characteristics and RBG measurements. Normality was assessed using the Shapiro–Wilk test. Differences between pretest and posttest RBG levels were analyzed using the paired-samples t-test when the paired data were normally distributed. The Wilcoxon signed-rank test was used when the normality assumption was not met. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the Health Research Ethics Committee of Dr. Moewardi Regional General Hospital, Surakarta, Indonesia (No. 937/V/HREC/2025). Written informed consent was obtained from all participants before enrollment Home-based program: After completion of the eighth face-to-face session, participants independently performed the prescribed health-management activities for 30 consecutive days during August 2023. Implementation was recorded in a monitoring logbook. The occupational therapist, assisted by community health cadres and health workers, monitored implementation and provided reinforcement during the home-program period.

TABLE 1. Components of the Occupational Therapy-Based Health Management Program

Session	Intervention component	Duration	Main Activities	Patient-Centered Application
1	Diabetes education	30-45 min	Education on T2DM, complications, self-management, and the role of daily routines in diabetes management	Participants identified their usual daily routines and individual challenges in managing diabetes
2	Healthy eating	30-45 min	Education on healthy eating, meal planning, portion control, and dietary modification	Dietary recommendations were related to participants' usual meals, food preferences, and household routines
3	Medication management and blood glucose monitoring	30-45 min	Education on medication adherence, medication routines, and blood glucose monitoring	Participants identified feasible ways to incorporate medication-taking and glucose monitoring into their existing routines
4	Physical activity	30-45 min	Diabetic foot exercise and education on safe physical activity	Exercise activities were adjusted according to participants' physical abilities and usual activity patterns
5	Physical activity	30-45 min	Walking exercise and strategies for incorporating walking into daily activities	Participants identified feasible opportunities for walking within their home and community routines
6	Lifestyle management	30-45 min	Stress management, healthy sleep habits, and daily routine management	Participants identified individual barriers and selected feasible strategies to support healthier routines
7	Home-program preparation and health-management practice	30-45 min	Review and practice of health-management activities and preparation for independent home practice	Participants selected and organized feasible health-management activities for implementation at home

8	Evaluation	30-45 min	Review of progress, reinforcement of self-management behaviors, problem solving, and preparation for the 30-day home program	Individual barriers, achievements, and feasible strategies were reviewed before initiation of the home program

TABLE 2. Participant Characteristics and Random Blood Glucose Levels Before and After the Intervention (n= 40)

Characteristic / Variable	**n**	**%**	**Mean ± SD**	**Minimum**	**Maximum**
Age group					
Middle-aged (45-59 years)	31	77.5	-	-	-
Older adults (60-74 years)	9	22.5	-	-	-
Sex					
Male	4	10.0	-	-	-
Female	36	90.0	-	-	-
Educational level					
Elementary school	12	30.0	-	-	-
Junior high school	12	30.0	-	-	-
Senior high school	16	40.0	-	-	-
Duration of diabetes					
1-4 years	4	10.0	-	-	-
5-8 years	20	50.0	-	-	-
9-13 years	16	40.0	-	-	-
Random blood glucose (mg/dL)					
Baseline	-	-	283.13 ± 36.10	215	350
Post-intervention	-	-	218.25 ± 30.37	170	275

RESULTS AND DISCUSSION

RESULTS

A total of 40 participants completed the study. Most participants were female (90.0%), aged 45–59 years (77.5%), had completed senior high school education (40.0%), and had lived with diabetes for 5–8 years (50.0%). Participant characteristics and random blood glucose measurements before and after the intervention are presented in Table 2. The mean random blood glucose (RBG) level decreased from 283.13 ± 36.10 mg/dL at baseline to 218.25 ± 30.37 mg/dL following completion of the intervention. The mean reduction was 64.88 mg/dL (95% CI: 62.35–67.40). A paired-samples t-test demonstrated a statistically significant difference between baseline and post-intervention RBG levels ($t = 52.04$, $p < 0.001$), with a Cohen's d of 8.23.

DISCUSSION

The findings indicate that the Occupational Therapy-Based Health Management Program was associated with a substantial reduction in random blood glucose (RBG) among individuals with T2DM. The large standardized effect observed in this study suggests that the intervention was associated with a meaningful change in short-term blood glucose levels. However, the post-intervention RBG level remained elevated, indicating that the participants had not achieved normoglycemia. Therefore, the reduction should be interpreted as an improvement in blood glucose levels rather than evidence of complete glycemic control. Random blood glucose represents glucose concentration at a single point in time and is influenced by factors such as meal timing, medication use, and daily activities; consequently, it should not be interpreted as a substitute for HbA1c in assessing longer-term glycemic control. Current diabetes guidelines emphasize HbA1c as an important measure of longer-term glycemic management, with an HbA1c target of <7%

considered appropriate for many nonpregnant adults with diabetes (American Diabetes Association Professional Practice Committee 2026). Persistent hyperglycemia remains clinically important because prolonged elevation of blood glucose can contribute to vascular and nerve damage and increase the risk of cardiovascular, visual, and other diabetes-related complications (World Health Organization 2023). The observed improvement is consistent with evidence supporting structured diabetes self-management education and support as an important component of diabetes care. Such interventions can provide individuals with the knowledge, skills, and confidence required to incorporate dietary management, physical activity, medication use, glucose monitoring, and other self-management behaviors into everyday life (Chrvala et al. 2019; Beck et al. 2017; Powers et al. 2020). The current intervention extended this principle through an occupational therapy framework by addressing health-management behaviors as activities that need to be integrated into established daily routines. Rather than providing education as an isolated activity, the program encouraged participants to identify their usual routines, recognize barriers to self-management, and practice feasible strategies within their everyday environment.

The multidimensional nature of the intervention may have contributed to the observed improvement. The program combined diabetes education, healthy eating, medication management, blood glucose monitoring, diabetic foot exercise, walking exercise, stress management, healthy sleep habits, and home-based practice. These components addressed several behavioral aspects of diabetes management simultaneously (Papale et al. 2025). Physical activity can contribute to improved glucose utilization and insulin sensitivity, while appropriate dietary practices, medication adherence, and regular monitoring support day-to-day management of blood glucose (Powers et al. 2020). Importantly, however, these mechanisms were not independently measured in the present study. The reduction in RBG therefore cannot be attributed to any single component, and the combined intervention should be considered as a whole when interpreting the findings.

The occupational therapy perspective may have particular relevance to the sustainability of diabetes self-management. Diabetes management requires repeated behaviors that occur within ordinary occupations and routines, including preparing meals, taking medication, engaging in physical activity, monitoring health status, and managing sleep and stress (Puzhakkal et al. 2025). By connecting these behaviors with participants' existing routines and practical circumstances, the intervention sought to reduce the gap between health recommendations and their application in everyday life. This approach is consistent with person-centered diabetes care, which emphasizes collaborative goal setting, individualized education, behavioral support, and the development of practical self-management skills (American Diabetes Association Professional Practice Committee 2025; Powers et al. 2020). The role of occupational therapy is therefore not limited to providing health information but also includes facilitating participation, adapting activities, and supporting the development of sustainable health-management routines.

The community-based nature of the program is also important. In community settings, individuals with T2DM manage most aspects of their condition outside formal healthcare facilities. A program that combines supervised education with a subsequent home-based phase may help transfer learned strategies from structured sessions into participants' everyday environments (Cappon et al. 2025). The involvement of community health cadres and health workers in monitoring the home program further provides a potential link between professional occupational therapy intervention and existing community health resources. At the community level, this model may strengthen local capacity to reinforce diabetes self-management behaviors and provide continued encouragement beyond the period of direct therapist contact (Esht et al. 2026). This is particularly relevant in settings where access to continuous professional diabetes education and rehabilitation services may be limited. Community-based approaches are consistent with the broader need to strengthen primary healthcare and self-management support for chronic diseases, particularly in low- and middle-income settings (International Diabetes Federation 2025; World Health Organization 2023).

The findings therefore have implications for occupational therapy and primary healthcare practice. An occupational therapy-based health management program may serve as a complementary approach to conventional diabetes management by addressing not only what individuals should do to manage diabetes but also how recommended behaviors can be incorporated into their daily lives. The program may be particularly relevant for community-dwelling adults who require practical support in translating diabetes management recommendations into daily routines. Nevertheless, implementation within primary healthcare should be conducted collaboratively with medical and other health professionals, particularly for medication management and clinical monitoring.

Several limitations should be considered when interpreting these findings. First, the one-group pretest–posttest design without a control group limits causal inference, as changes in RBG may also have been influenced by medication use,

dietary changes, physical activity outside the intervention, or other factors occurring during the study period. Second, the final sample comprised 40 participants from a single community, which limits generalizability to other populations and settings. Third, the study used RBG as the primary outcome and did not measure HbA1c; therefore, the findings reflect short-term changes in blood glucose rather than sustained improvement in long-term glycemic control. Fourth, although the intervention included a 30-day home program, longer-term adherence and maintenance of behavioral changes were not assessed. Future studies should use controlled or randomized designs, larger and more diverse samples, HbA1c and functional or behavioral outcomes, and longer follow-up periods to determine whether the observed improvement in blood glucose is sustained and whether the intervention produces broader clinical and community-level benefits.

CONCLUSION

This study provides preliminary evidence that an Occupational Therapy-Based Health Management Program may support improvement in random blood glucose individuals with type 2 diabetes mellitus or individuals with T2DM in a community setting. The potential value of the program lies in integrating diabetes self-management behaviors into everyday routines through structured education, activity modification, behavioral practice, and home-based self-management. This approach may provide a complementary role for occupational therapy within community-based diabetes management and primary healthcare services. However, the findings should be interpreted cautiously because the study used a one-group pretest–posttest design, measured random blood glucose rather than a longer-term indicator such as HbA1c, and included a relatively small sample from a single community. The observed reduction in random blood glucose should therefore not be interpreted as definitive evidence of clinically meaningful long-term glycemic improvement. Future controlled studies with larger samples, longer follow-up, and additional clinical and behavioral outcomes are needed to determine the sustained effectiveness and broader health impact of occupational therapy-based health management programs for people with T2DM.

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