

Health Education to Improve the Knowledge and Attitudes of Type 2 Diabetes Mellitus Patients

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ABSTRACT

Type 2 Diabetes Mellitus (T2DM) is a major non-communicable disease that continues to increase globally and poses significant challenges to public health, particularly in developing countries. One of the main obstacles in T2DM management is inadequate patient knowledge and suboptimal attitudes toward disease control and self-care. This community service program aimed to improve the knowledge and attitudes of patients with T2DM through a structured health education intervention combined with physical activity promotion. The program was implemented using a pre-test and post-test design involving patients with T2DM at a primary healthcare clinic. Educational activities included interactive lectures, discussions, visual media, and guidance on simple and safe physical exercises appropriate for participants' conditions. Patient knowledge and attitudes were assessed before and after the intervention using structured questionnaires. The results demonstrated a significant improvement in patients' knowledge, with the mean score increasing from 11.5 in the pre-test to 15.9 in the post-test ($p = 0.000$). In addition, most participants showed positive attitudes toward healthy lifestyle behaviors related to diabetes management. These findings indicate that health education combined with physical activity promotion is effective in enhancing patients' understanding and supporting positive attitudes toward self-management of T2DM. Integrating regular and structured educational programs into primary healthcare services is recommended to improve long-term diabetes management and prevent complications.

Keywords: Attitude; Health Education; Knowledge; Physical Activity; Type 2 Diabetes Mellitus.



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INTRODUCTION

Diabetes Mellitus (DM) is one of the most significant non-communicable diseases worldwide and represents a growing public health challenge, particularly in developing countries such as Indonesia. Type 2 Diabetes Mellitus (T2DM) accounts for the vast majority of diabetes cases and is closely associated with lifestyle changes, including unhealthy dietary patterns, physical inactivity, obesity, and urbanization (Agus Salim et al., 2025). The progressive nature of T2DM, combined with its long-term complications, such as cardiovascular disease, nephropathy, neuropathy, and diabetic foot ulcers, places a substantial burden on individuals, families, and healthcare systems (Alaofè et al., 2021). Despite advances in pharmacological therapy, optimal diabetes control remains difficult to achieve without adequate patient involvement in daily self-management (Alfiah et al., 2024).

One of the main problems in T2DM management is the low level of patient knowledge and inappropriate attitudes toward the disease (Arsya et al., 2025). Many patients perceive diabetes as a condition that can be managed solely through medication, while underestimating the importance of lifestyle modification, regular physical activity, dietary regulation, and routine blood glucose monitoring (Detty et al., 2020). This misconception often leads to poor adherence to treatment recommendations and delayed recognition of complications (Krisnawati et al., 2024). In primary healthcare settings, especially clinics serving elderly populations, limited health literacy further exacerbates this problem. Patients may not fully understand the causes of diabetes, its symptoms, potential complications, or the rationale behind long-term therapy, resulting in suboptimal disease control (Leong et al., 2022).

Another critical issue is the inadequate attitude and behavior related to self-care practices among patients with T2DM. Even when patients possess basic information about diabetes, this knowledge does not always translate into positive attitudes or consistent healthy behaviors (Marselin et al., 2021). Sedentary lifestyles, irregular physical activity, unhealthy eating habits, and non-compliance with medication regimens remain common. In older adults, physical limitations, lack of motivation, and insufficient family or social support can further hinder the adoption of healthy behaviors. Consequently, blood glucose levels often remain uncontrolled, increasing the risk of acute and chronic complications and reducing overall quality of life (Muhamad & Budiharto, 2023).

These challenges highlight the need for effective, structured, and context-appropriate interventions that go beyond pharmacological treatment. Health education has been widely recognized as a cornerstone of comprehensive diabetes management (Nur & Anggraini, 2022). Education empowers patients by improving their understanding of the disease, correcting misconceptions, and fostering positive attitudes toward self-care. Through targeted educational interventions, patients can develop the skills and confidence necessary to manage their condition, make informed decisions, and actively participate in their own care. Importantly, education is most effective when delivered in an interactive and patient-centered manner, taking into account patients' age, educational background, cultural context, and daily realities.

In addition to education, the promotion of regular physical activity represents a practical and low-cost strategy to improve glycemic control in patients with T2DM. Moderate physical activity enhances insulin sensitivity, reduces blood glucose levels, supports weight management, and improves cardiovascular health. Simple and safe exercises, such as light aerobic activity or foot exercises, are particularly suitable for elderly patients and can be integrated into daily routines. When combined with education, physical activity interventions can reinforce positive attitudes toward a healthy lifestyle and encourage long-term behavioral change.

Therefore, this study addresses the problem of insufficient knowledge and suboptimal attitudes among patients with Type 2 Diabetes Mellitus by implementing a structured health education program combined with physical activity promotion. The proposed solution focuses on providing clear, understandable, and relevant information about diabetes, its management, and the benefits of lifestyle

modification, while actively engaging patients through discussion and practical activities. By improving knowledge and shaping positive attitudes, this intervention is expected to enhance patients' self-management abilities, support better glycemic control, and ultimately contribute to the prevention of diabetes-related complications. Such an approach is particularly relevant in primary healthcare settings, where preventive and promotive strategies play a vital role in improving long-term health outcomes for patients with chronic diseases.

METHOD of IMPLEMENTATION

The community service program was implemented through a structured and systematic approach to ensure that the objectives of improving knowledge and attitudes of patients with Type 2 Diabetes Mellitus were achieved effectively. The implementation consisted of five main stages that were relevant to the characteristics of the target population and aligned with the objectives of health education and physical activity promotion.

Preparation and Coordination Stage

The first stage focused on administrative, technical, and academic preparation. Coordination was carried out with the management and healthcare staff of the primary clinic to obtain official permission, determine the schedule, and identify eligible participants. During this stage, educational materials were developed, including presentation slides, posters, and leaflets containing information on Diabetes Mellitus, lifestyle management, physical activity, and medication adherence. In addition, research instruments in the form of structured questionnaires to measure patients' knowledge and attitudes were prepared and reviewed to ensure clarity and relevance. This stage ensured that all resources, materials, and stakeholders were ready prior to implementation.

Baseline Assessment (Pre-Test) Stage

The second stage involved the initial assessment of participants' knowledge and attitudes toward Type 2 Diabetes Mellitus. Before the educational intervention, participants were asked to complete a pre-test questionnaire. This assessment aimed to identify baseline levels of understanding related to the definition of diabetes, risk factors, symptoms, complications, lifestyle management, and physical activity. Collecting baseline data was essential to determine existing gaps in knowledge and attitudes, as well as to serve as a reference point for evaluating the effectiveness of the intervention.

Health Education and Physical Activity Intervention Stage

The third stage was the core implementation phase of the community service program. Health education was delivered through interactive lectures, discussions, and visual media. The educational content covered basic concepts of Type 2 Diabetes Mellitus, the importance of blood glucose control, dietary regulation, medication adherence, and the role of regular physical activity in diabetes management. The session encouraged participant engagement through question-and-answer discussions to clarify misconceptions and reinforce key messages. In addition to education, participants were guided through simple and safe physical activities suitable for their age and health condition. This combination was intended to strengthen understanding while fostering positive attitudes and practical self-care behaviors.

Post-Intervention Assessment (Post-Test) Stage

The fourth stage involved evaluating the immediate impact of the intervention. After completing the education and physical activity session, participants were asked to complete a post-test questionnaire using the same instrument as the pre-test. This assessment aimed to measure changes in knowledge and attitudes following the intervention. Comparing pre-test and post-test results allowed for an objective evaluation of the effectiveness of the community service program in improving participants' understanding and attitudes toward diabetes management.

Evaluation, Feedback, and Follow-Up Stage

The final stage focused on reflection and sustainability. The results of the pre-test and post-test were analyzed to identify improvements and remaining challenges. Feedback was gathered informally from participants regarding the clarity, usefulness, and relevance of the educational activities. This stage also included summarizing key messages and encouraging participants to apply the knowledge and behaviors in their daily lives. Recommendations were provided to clinic staff to support ongoing education and lifestyle guidance for patients with Type 2 Diabetes Mellitus. This stage ensured that the program outcomes could be sustained and potentially replicated in similar community healthcare settings.

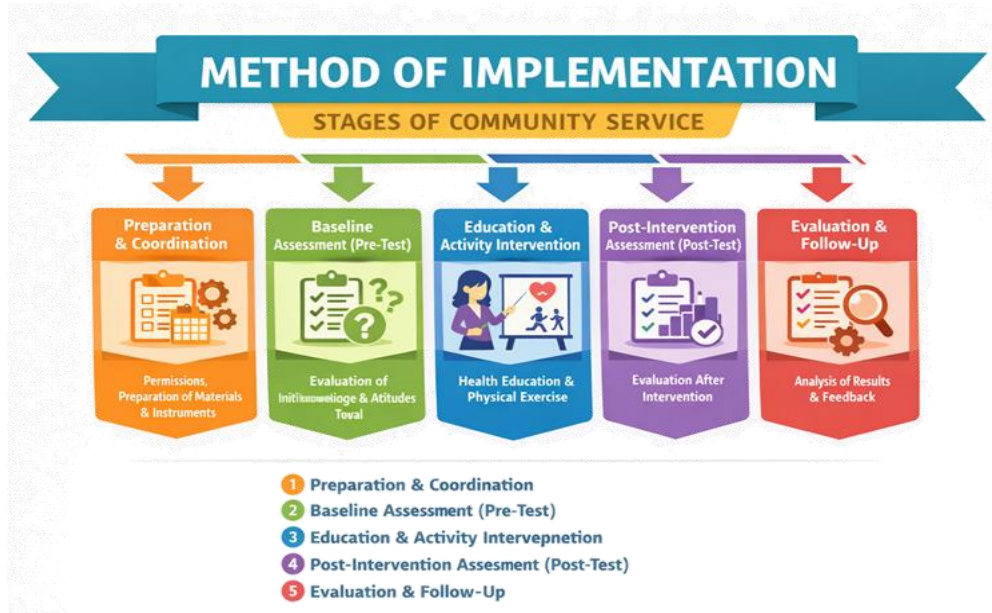


Figure 1. Methods of implementing public services

RESULT

This section presents the results of the study evaluating the effect of an educational intervention on the knowledge of patients with Type 2 Diabetes Mellitus. The analysis focuses on the comparison between pre-test and post-test scores to determine changes in participants' knowledge levels following the intervention.

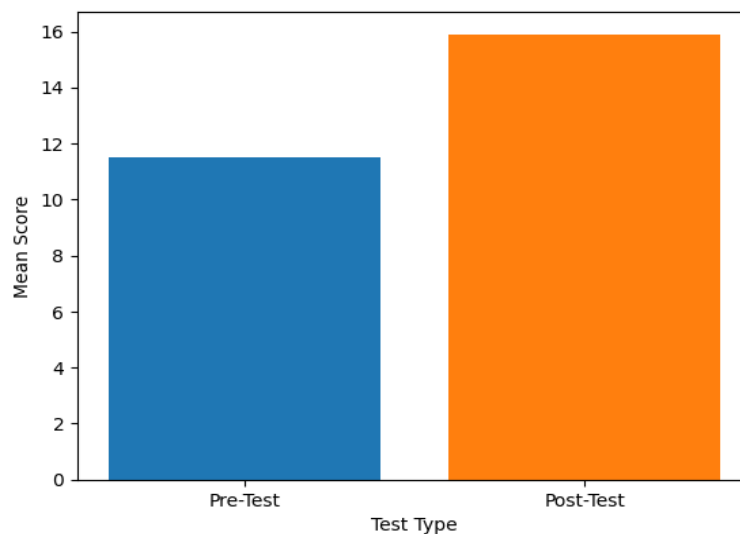


Figure 2. Bar Chart of Pre-Test and Post-Test Mean Knowledge Scores

Figure 2. Presents a comparison of the mean knowledge scores before and after the educational intervention. The Pre-Test is represented by a blue bar, while the Post-Test is shown with an orange bar,

clearly distinguishing the two measurement points. The results of this study demonstrate a clear and meaningful improvement in patients' knowledge of Type 2 Diabetes Mellitus following the educational intervention. The comparison between pre-test and post-test scores shows a substantial increase in the mean knowledge score from 11.5 before the intervention to 15.9 after the intervention. This finding indicates that the education program was effective in enhancing participants' understanding of diabetes-related concepts, including disease characteristics, risk factors, symptoms, and management strategies.

The bar chart visualization further reinforces this finding, as the post-test score is markedly higher than the pre-test score. Statistical analysis confirmed that the difference between pre-test and post-test scores was significant ($p = 0.000$), suggesting that the observed improvement did not occur by chance. These results are consistent with previous studies reporting that structured health education can significantly improve knowledge among patients with chronic diseases, particularly diabetes mellitus. In addition to improved knowledge levels, the majority of participants demonstrated a positive attitude toward healthy lifestyle behaviors related to diabetes management. Although this study primarily focused on knowledge outcomes, the favorable attitude observed among most participants supports the assumption that increased knowledge may contribute to better perceptions and readiness to adopt healthy behaviors. However, a small proportion of participants still exhibited moderate to low attitudes, indicating the need for continuous and repeated educational efforts.

Overall, the findings highlight the importance of health education as an effective strategy for improving patients' knowledge and supporting diabetes self-management. Educational interventions that are interactive, structured, and tailored to patients' needs can play a crucial role in empowering patients to better understand their condition. The educational intervention significantly improved the knowledge of patients with Type 2 Diabetes Mellitus. These results suggest that regular and well-designed educational programs should be integrated into primary healthcare services to enhance patient knowledge, promote positive attitudes, and ultimately support better disease management and quality of life among diabetes patients.

DISCUSSION

The present study aimed to evaluate the effectiveness of an educational intervention in improving knowledge among patients with Type 2 Diabetes Mellitus (T2DM). The findings clearly demonstrate that the educational program had a significant positive impact on patients' knowledge levels, as reflected by the substantial increase in mean scores from the pre-test to the post-test assessment. This improvement indicates that structured health education plays a crucial role in enhancing patients' understanding of diabetes and its management.

The increase in the mean knowledge score from 11.5 to 15.9 suggests that participants were able to better comprehend key concepts related to diabetes mellitus following the intervention. Prior to education, many patients showed limited understanding of fundamental aspects of T2DM, including disease mechanisms, symptoms, risk factors, and the importance of lifestyle modification. This is consistent with previous studies reporting that inadequate knowledge remains a major barrier to effective diabetes management, particularly in primary healthcare settings. After the educational session, participants demonstrated a higher level of knowledge, indicating that the information provided was accessible, relevant, and well understood (Peter et al., 2022).

The statistically significant difference between pre-test and post-test scores ($p = 0.000$) further confirms the effectiveness of the intervention. This finding aligns with earlier research showing that educational interventions, especially those delivered through interactive methods such as discussions, visual media, and printed materials, are effective in improving patient knowledge. Education enables patients to recognize the importance of glycemic control, routine monitoring, adherence to medication, and lifestyle changes, which are essential components of diabetes self-management (Peter et al., 2022).

Visual representation through a bar chart highlights the magnitude of improvement between pre-test and post-test scores. The clear contrast between the two assessment points reinforces the conclusion that the intervention successfully addressed knowledge gaps. Visual data presentation not only supports statistical findings but also provides an intuitive understanding of the intervention's impact, making the results more accessible to both academic and non-academic audiences (Pusparini et al., 2025).

In addition to knowledge improvement, the majority of participants demonstrated a positive attitude toward healthy lifestyle practices associated with diabetes management (Shawahna et al., 2021). Although attitude was not measured using a pre-test and post-test design in this study, the high proportion of participants with good attitudes suggests that education may also contribute indirectly to favorable perceptions of diabetes care (Selfia, 2024). Previous studies have shown that increased knowledge often leads to improved attitudes and greater motivation to adopt healthy behaviors, such as regular physical activity, dietary control, and medication adherence. However, the presence of participants with moderate or low attitudes indicates that knowledge alone may not be sufficient to fully change attitudes and behaviors (Sasarari et al., 2025).

Several factors may influence the effectiveness of educational interventions, including participants' age, educational background, cognitive ability, and prior exposure to health information (Slamet & Wahyuningsih, 2022). In this study, most participants were older adults, a group that often experiences challenges in understanding health information due to cognitive decline or limited health literacy (Suprpto, 2024). Despite these challenges, the significant improvement in knowledge suggests that the educational materials and delivery methods were appropriate for the target population. This highlights the importance of tailoring educational content to the characteristics and needs of patients, particularly in elderly populations (Syaharuddin et al., 2025).

Despite the positive findings, this study has several limitations that should be considered. The use of a one-group pre-test and post-test design without a control group limits the ability to attribute changes in knowledge solely to the educational intervention (Zulfiah et al., 2025). External factors, such as informal discussions among participants or prior exposure to diabetes-related information, may have contributed to the observed improvements. Additionally, the relatively small sample size and short duration of follow-up limit the generalizability of the findings and do not allow for assessment of long-term knowledge retention or behavioral changes (Teapon et al., 2024).

Future studies should consider using randomized controlled designs, larger sample sizes, and longer follow-up periods to evaluate the sustainability of knowledge improvement and its impact on clinical outcomes, such as glycemic control. Incorporating family involvement and repeated educational sessions may also enhance the effectiveness of interventions and support long-term behavior change. In conclusion, the findings of this study demonstrate that health education is an effective approach to improving knowledge among patients with Type 2 Diabetes Mellitus. Educational interventions implemented in primary healthcare settings can serve as a valuable strategy to empower patients, enhance self-management, and ultimately improve health outcomes.

CONCLUSION

The educational intervention was effective in significantly improving the knowledge of patients with Type 2 Diabetes Mellitus, as demonstrated by the increase in post-test scores compared to pre-test scores. These findings indicate that structured health education can successfully enhance patients' understanding of diabetes, which is a critical component in supporting effective disease management and promoting healthier lifestyles. It is recommended that regular and structured educational programs be integrated into routine services at primary healthcare facilities to maintain and further improve patient knowledge. Future interventions should involve repeated education sessions, use varied and interactive

learning media, and include family members to strengthen long-term knowledge retention and encourage sustainable behavior change among diabetes patients.

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