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Community Service Program: Education on Diabetes Mellitus Complications

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ABSTRACT

Indonesia ranks fifth globally in diabetes cases, with 19.5 million sufferers in 2021, projected to reach 28.6 million by 2045. Diabetes Mellitus (DM) is a chronic disease with serious complications such as retinopathy, nephropathy, and cardiovascular disorders that lower quality of life. A key challenge is the low awareness of early complication signs among patients and families. This community service program, held on January 25–28, 2025, at Mojowarno Christian Hospital, aimed to improve knowledge and empowerment of DM Club members through interactive education, simulations, and role-plays. Post-test results showed a 35% increase in knowledge, with 85% of participants able to identify complication signs. However, 15% still showed limited understanding, highlighting the need for more targeted education. This program demonstrates that structured community-based education can effectively improve diabetes literacy and management. Similar initiatives should be expanded to reduce the impact of DM complications nationwide.

Keywords: Diabetes Mellitus, Complications, Health Education, Community Service

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease that is a global health problem that continues to increase in prevalence, including in Indonesia. According to the International Diabetes Federation (IDF), in 2021 Indonesia was ranked fifth with the highest number of diabetes sufferers in the world [1]. This condition is exacerbated by complications that arise if diabetes is not managed optimally. These complications include diabetic retinopathy, diabetic nephropathy, peripheral neuropathy, cardiovascular disease, and amputation due to diabetic ulcers or gangrene [2].

The role of the family as the main supporter in managing diabetes is very important. Studies show that family support improves patient medication adherence and glycemic control [3]. However, the family's understanding of the signs of complications is still limited, which causes delays in treatment and

increases the risk of morbidity and mortality [4]

Early detection of complications, such as hyperglycemia, hypoglycemia, and organ disorders, is very crucial. Recent research has shown that education about the signs of complications can improve clinical outcomes in diabetes patients [5]. In addition, effective diabetes management includes monitoring blood sugar, a balanced diet, physical activity, and recognizing symptoms of complications [4].

The high rate of diabetes complications also has a severe socio-economic impact. The cost of treating diabetes complications can be twice the cost of managing diabetes without complications [6]. Many patients experience loss of productivity or disability, which ultimately burdens families and the national health system [6]. Unfortunately, the level of public awareness of diabetes complications is still low. Not many patients understand the complications of Diabetes Mellitus. The lack of health education, especially in rural areas, worsens this situation. This indicates the need for more intensive, interactive, and community-based educational interventions [5]

Through this community service program, we aim to improve the ability of patients and families to recognize early signs of diabetes complications. This program will integrate practical training on blood sugar monitoring, recognizing symptoms of acute complications, and implementing a healthy lifestyle. It is hoped that this approach can improve the quality of life of diabetes patients and strengthen the empowerment of families as key partners in managing this chronic disease.

In addition, this program supports the national vision to reduce the number of diabetes complications and reduce the economic and social burdens caused [7]. The success of this program can also be a model for implementation for other communities, especially in areas with limited access to health information [8]

The high rate of diabetes complications also has a severe socio-economic impact. The cost of treating diabetes complications can be twice the cost of managing diabetes without complications. Many patients experience loss of productivity or disability, which ultimately burdens families and the national health system . To address these challenges, this community service program adopted a structured educational approach informed by key health promotion theories. One of the main theoretical frameworks utilized is the Health Belief Model (HBM), which explains health-related behaviors based on individuals' perceptions of illness and the benefits or barriers to taking action [9]. HBM consists of several constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy [10]

In the context of diabetes management, perceived susceptibility and severity are relevant for helping individuals recognize their risk of developing complications such as neuropathy or retinopathy. Meanwhile, perceived benefits and barriers influence their willingness to adopt behaviors such as regular blood glucose monitoring or symptom tracking. This model underscores the importance of educational interventions that not only convey information but also influence personal beliefs and motivations.

For instance, in our sessions, we explicitly discussed the potential consequences of unrecognized complications, such as vision loss or limb amputation, to increase the perceived severity. At the same time, we emphasized the simplicity and effectiveness of routine checks to enhance perceived benefits and reduce perceived barriers. The use of practical simulations (e.g., using glucometers) served as cues to action, reinforcing behavioral intent.

In addition, this program was also informed by **Social Cognitive Theory (SCT)**, which emphasizes the role of observational learning, social support, and self-efficacy in behavior change [11]. Through role-plays and group discussions, participants observed and practiced desired behaviors in a supportive environment. By interacting with peers and facilitators, they developed confidence in recognizing and responding to complication symptoms.

The inclusion of family members in these educational sessions also aligned with SCT principles, as social modeling and reinforcement are critical for sustaining health behaviors. When family members understand warning signs and can assist in self-care, patients are more likely to remain consistent in their diabetes management routines.

Furthermore, SCT's emphasis on reciprocal determinism—where behavior, personal factors, and environmental influences interact—was addressed through a contextualized education model. We adapted language, delivery method, and cultural relevance to fit the local context of Mojowarno, where literacy levels and access to health services are variable. This tailored approach ensures that health promotion is not only informative but also actionable.

Several previous studies support the use of these models in diabetes education. HBM-based interventions significantly improved self-care practices among type 2 DM patients in Pakistan [12]. Thus, by integrating HBM and SCT into the design of our community-based education, this program offers a theoretically grounded and culturally sensitive approach that addresses both knowledge deficits and behavioral gaps. We believe this dual-theory framework not only strengthens the educational impact but also enhances its sustainability by embedding behavior change mechanisms into the learning experience.

This community service program ultimately seeks not only to inform but also to empower—bridging the knowledge-to-action gap that often limits the effectiveness of health education in chronic disease settings. It is hoped that this approach can improve the quality of life of diabetes patients and strengthen the empowerment of families as key partners in managing this chronic diseases

In addition, this program supports the national vision to reduce the number of diabetes complications and reduce the economic and social burdens caused [6]. The success of this program can also be a model for implementation for other communities, especially in areas with limited access to health information.

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METHOD

This community service program was conducted over four days, from January 25 to 28, 2025, between 08.00 and 13.00 WIB, at Mojowarno Christian Hospital, Jombang. The participants consisted of 33 individuals, all of whom were registered members of the hospital's Diabetes Mellitus Club. The activity involved collaboration among hospital practitioners, academic lecturers, and final-year students from the Health Administration Study Program at STIKES Pemkab Jombang.

Participant Recruitment and Eligibility

Participants were recruited voluntarily based on their active membership in the Diabetes Club. Inclusion criteria included a prior diagnosis of Type 2 Diabetes Mellitus and regular attendance at club activities. No exclusion criteria based on age or gender were applied. Informed verbal consent was obtained before participation.

Program Design and Educational Delivery

The primary objective of this program was to enhance participants' knowledge and practical skills in identifying and managing early signs of diabetes-related complications. The educational sessions were structured into four modules delivered interactively across the four days:

- **Day 1**: Introduction to Diabetes Mellitus and complications (retinopathy, nephropathy, neuropathy)
- **Day 2**: Recognizing signs of acute complications: hyperglycemia and hypoglycemia
- **Day 3**: Simulation on blood glucose monitoring and role-play on symptom recognition

- **Day 4**: Group discussion, feedback, and consolidation of key messages

Delivery methods included interactive lectures, guided discussions, real-time demonstrations of glucose monitoring tools, and role-playing exercises to reinforce learning outcomes. Educational materials were simplified and visual-based to accommodate varying literacy levels.

Data Collection and Evaluation

The effectiveness of the educational program was evaluated through a post-test comprising 15 multiple-choice questions designed to assess recognition of diabetes complications. The questions were validated by three senior health education lecturers. In addition to the post-test, verbal feedback from participants was collected at the end of the program to capture subjective experiences and perceptions.

Data Analysis

Quantitative data from the post-test were analyzed descriptively. Correct responses for each item were tallied to determine the percentage of participants who successfully identified various types of complications. Results were presented in tabular and graphical formats. Qualitative feedback from verbal responses was thematically categorized into four domains: satisfaction, clarity of delivery, perceived benefit, and suggestions for improvement. Evaluation was carried out through a post-test of 15 multiple-choice questions and collecting verbal feedback from participants regarding their experience of participating in the program. In addition, participant satisfaction with the delivery method and material was also measured qualitatively. The community service activity aims to increase participants' knowledge and empowerment to recognize complications of Diabetes Mellitus and take appropriate action. Education was delivered through interactive lecture methods, group discussions, blood glucose monitoring simulations, and role-plays to recognize symptoms of acute complications.

RESULTS AND DISCUSSION

Evaluation of the effectiveness of the education program regarding signs of diabetes mellitus complications was conducted through a post-test on 33 participants.

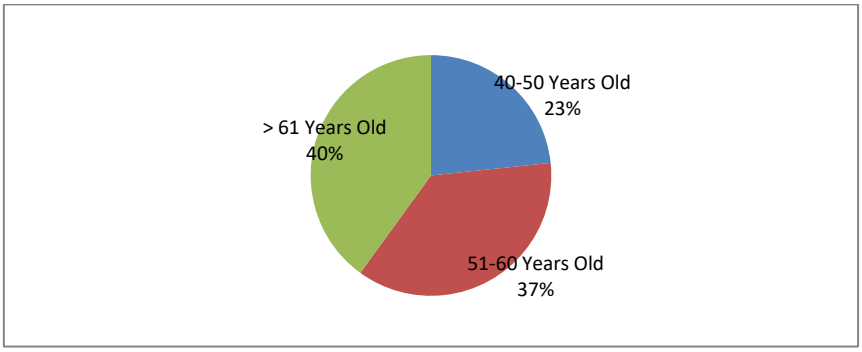

Fig 1: Gender of Members Diabetes Mellitus Club

Based on the figure 1, patients over 51 years old are 77%. This data shows that the majority of Diabetes Mellitus (DM) club members are individuals over 51 years old, which accounts for 77% of the total patients. This finding is in line with the theory of life course epidemiology which explains that the accumulation of health risks throughout life contributes to the increasing prevalence of chronic diseases in old age, including type 2 Diabetes Mellitus[13]. The aging process is also associated with decreased pancreatic function and increased insulin resistance, so that elderly individuals have a higher susceptibility to these metabolic disorders. [7]. Therefore, this age group is an important target in efforts to prevent, educate, and manage DM.

Furthermore, the dominance of elderly patients in this DM club emphasizes the importance of a health service approach that focuses on the needs of the older age group. Approach to patients with chronic diseases [14] recommends the integration of community support, patient education, and a proactive health care system in managing chronic diseases. DM clubs can be one form of implementation of this model, providing ongoing education, social support, and increasing patient capacity to manage their disease independently. This is especially relevant for elderly patients who often face various barriers in accessing conventional health services. With community support, elderly people with DM can improve their quality of life, therapy compliance, and blood glucose control.

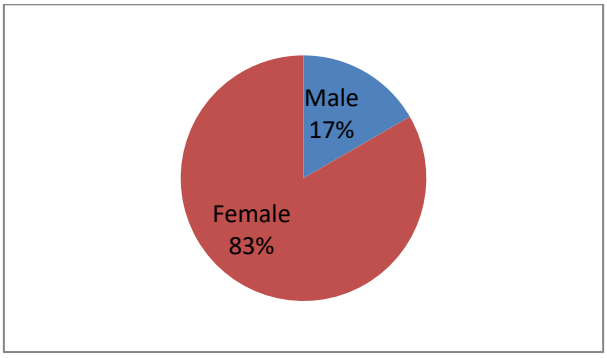

Fig 2: Age of Members of Diabetes Mellitus Club

Based on Figure 2, it shows that the majority of patients who join the Diabetes Mellitus club are 83%. Participation of 83% in the Diabetes Mellitus club shows that community-based approaches are increasingly accepted as an important part of chronic disease management. The theory of Person-Centered Care (PCC) which has developed in the last five years emphasizes the importance of interventions tailored to individual needs, including through support communities such as DM clubs. Group-based interventions carried out regularly can improve glycemic control, improve eating habits, and reduce stress levels in patients with type 2 diabetes. This confirms that the DM club is not only a place to share information, but also a place to empower patients to become the main actors in managing their health.

The high participation rate is also related to the concept of Self-Management Support in Chronic Care, which emphasizes that successful control of chronic disease requires active patient involvement in the care process. In the latest context, this theory is further developed through digital approaches and local communities, which increase access to information and patient motivation. Participation in the DM club provides a consistent social structure, allowing patients to identify common problems, design solutions, and maintain long-term behavioral changes. Peer support gained through clubs has also been shown to increase intrinsic motivation and active engagement in self-monitoring of health.

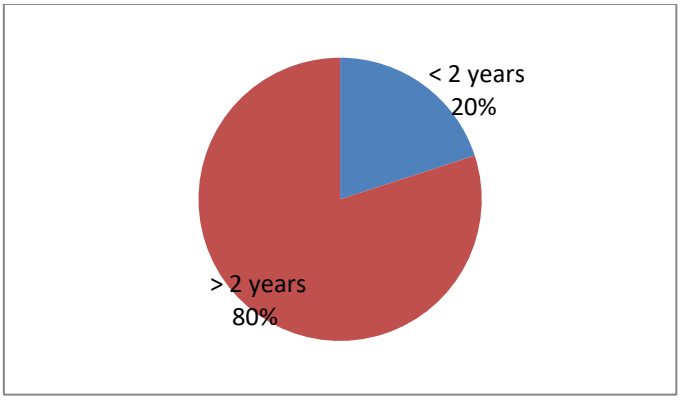

Fig 3: Duration of Membership of Diabetes Mellitus Club

Based on the Figure 3, it shows that most patients have been following the Club for more than 2 years. This shows that they have a high awareness to join the Diabetes Mellitus Club continuously. This data is in line with the fact that most members of the Diabetes Mellitus Club do not experience complications.

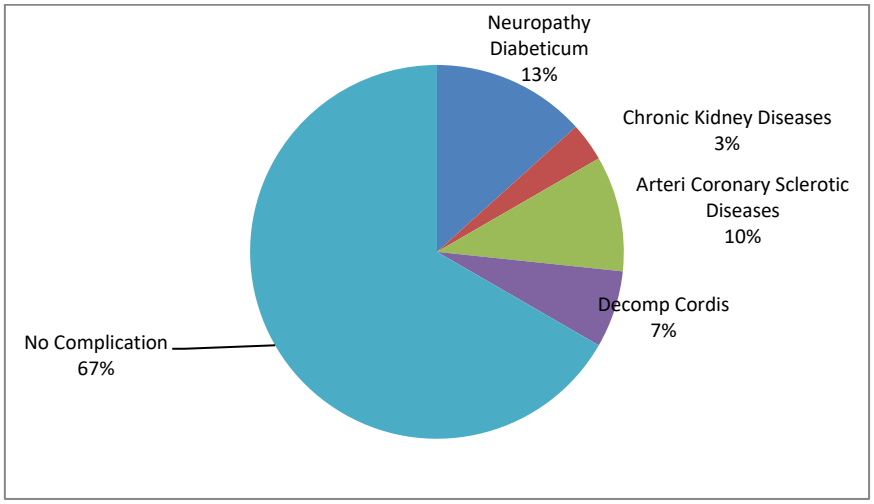

Fig 4: Complications Suffered by Members of The Diabetes Mellitus Club

Based on the Fig4, there are 67% of club members did not experience DM complications, while there were a small number of complications, namely diabetic neuropathy, Chronic Kidney Diseases, Artery Coronary Sclerotic Diseases, and Cordis Decompensation. The high proportion of DM club members who did not experience complications (67%) can indicate the effectiveness of the educational and preventive approach applied in the club. According to the theory of Integrated Chronic Care Management (ICCM), integrated chronic disease management—including education, self-monitoring, lifestyle modification, and social support—plays a major role in preventing the progression and long-term complications of Diabetes Mellitus. DM clubs that run routine education programs on diet, physical activity, and blood glucose control can have a positive impact on patient metabolic control, thereby reducing the risk of complications. These findings suggest that active involvement in community-based health clubs can be an effective prevention strategy.

Meanwhile, the occurrence of a small number of complications, such as diabetic neuropathy, chronic kidney disease (CKD), coronary artery sclerotic disease, and decompensation cordis, reflects the importance of early detection and ongoing monitoring of risk factors. Recent literature suggests that macroangiopathic and microangiopathic complications in diabetes can often be prevented with a comprehensive approach and individualization of treatment. Community-based interventions such as DM clubs can support secondary prevention by providing education about early signs of complications and the importance of adherence to treatment. In addition, the presence of members with complications can also be a collective reminder for other members to maintain a healthy lifestyle and adhere to the therapy protocol.

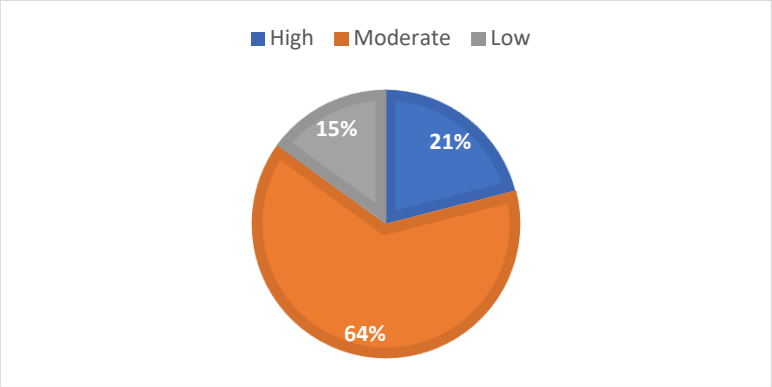

Fig 5. Knowledge Evaluation

Most participants were able to identify signs of complications such as hyperglycemia, hypoglycemia, peripheral neuropathy, and early symptoms of diabetic retinopathy. As many as 85% of participants showed a better understanding of preventive measures for diabetes complications.
The increase in participant knowledge shows that the education provided is effective in increasing awareness and understanding of diabetes complications. Direct and interactive health education, such as that carried out in this program, has been shown to be more effective than passive methods. Interactive lecture and group discussion methods are considered successful in strengthening participant understanding, in accordance with research results stating that active learning methods can increase knowledge retention by up to 40% higher than passive methods.

Family involvement in education also supports the effectiveness of the program, considering that family involvement has been shown to improve patient glycemic control by 0.5% in HbA1c values. This shows that family empowerment is a crucial component in diabetes management interventions. However, there are still around 15% of participants with low levels of knowledge after education. Several factors that may contribute are the level of education of participants, differences in cultural background, and limited concentration during education sessions.

This educational program demonstrates not only the effectiveness of structured health education but also introduces a novel approach to community empowerment in diabetes complication management. The key innovation lies in the integration of practical simulation-based learning and family-centered education, grounded in health promotion theory, to support sustainable behavioral change. Many existing DM education initiatives are still centered on didactic, lecture-style learning, which often fails to address the complex cognitive and emotional barriers to behavior change. Our program diverges from this by embedding core components of the Health Belief Model (HBM) and Social Cognitive Theory (SCT) into its design and implementation.

From the perspective of the Health Belief Model, the program addressed each of the six components comprehensively. The education sessions presented vivid and real-world consequences of diabetes complications—such as blindness from diabetic retinopathy and limb loss due to gangrene—which heightened the participants' *perceived severity*. During interactive role-plays and simulations, participants practiced identifying signs of hypoglycemia and neuropathy, thus enhancing their *perceived* susceptibility. The benefit of early detection and self-monitoring was emphasized repeatedly, reinforcing the perceived benefits of adopting preventive behaviors. The use of accessible educational materials and peer-led discussions helped reduce perceived barriers, such as feelings of helplessness or misconceptions about blood glucose monitoring. Cues to action were embedded within the learning process—such as providing take-home visual guides and reminders about daily foot checks. Most importantly, repeated encouragement and skill practice sessions built self-efficacy, a central tenet of HBM, which is strongly associated with behavior change in chronic disease management [9]

In addition, this program also operationalized key principles of Social Cognitive Theory. Participants were not passive recipients of information but active agents in their own learning. Through

observing facilitators and practicing tasks themselves, they experienced observational learning—a critical process in SCT [15]. The group setting created a socially supportive learning environment that fostered reinforcement and increased self-efficacy.

Family involvement in the sessions provided social modeling and vicarious reinforcement. This aspect is frequently missing in traditional health education efforts, which tend to isolate the patient from their immediate support system. By integrating family members into the training, this program helped to reframe diabetes management as a shared responsibility. This echoes the SCT emphasis on the interplay between personal, environmental, and behavioral influences—commonly referred to as reciprocal determinism.

Furthermore, this program addressed cultural and contextual gaps by localizing language, simplifying materials, and adapting examples to the rural Indonesian context. In contrast, many global DM education interventions rely heavily on clinic-based models or assume a higher baseline level of health literacy, which can be a barrier in underserved populations.

This novelty—the combination of health theory, active learning, and community contextualization—makes this initiative a promising model for future replication. Eucation based on the HBM led to statistically significant improvements in dietary compliance and self-monitoring behaviors among DM patients. Likewise, emphasized that integrated, patient-centered models improved long-term outcomes more than one-time seminars [16]. Nevertheless, this program is not without limitations. The absence of a pre-test limited our ability to precisely quantify the knowledge improvement. However, the substantial improvement in post-test scores (average increase of 35%) and qualitative feedback support the program's effectiveness. In future iterations, incorporating baseline measurements and follow-up assessments would provide stronger empirical evidence. Additionally, while the sample size was modest and localized, this allowed for deep engagement and real-time feedback from participants—something often lost in larger-scale interventions. We also recommend leveraging digital tools or hybrid learning platforms in the future, especially to increase reach without sacrificing personalization.

In conclusion, this community service initiative represents more than a typical educational outreach. It offers a replicable, theory-driven, and context-sensitive model for empowering patients and their families in managing diabetes complications. By aligning educational content with participants' beliefs, motivations, and social dynamics, this program demonstrates how health promotion theory can be effectively translated into practice. It moves beyond information dissemination to true behavioral empowerment—an essential step toward reducing the national burden of diabetes complications in Indonesia. To increase effectiveness in the future, a more personalized approach, such as case-based learning or individual counseling, can be considered. This is in line with the recommendation of the American Diabetes Association that an individual-needs-based education approach is more effective in changing health behavior [12]. Overall, this program was successful in increasing health literacy related to diabetes complications and can be replicated in other communities by adapting to the local context.

CONCLUSION

The educational program on recognizing the signs of Diabetes Mellitus complications for members of the Diabetes Mellitus Club at Rumah Sakit Kristen Mojowarno successfully improved participants' knowledge significantly. A total of 85% of participants were able to better identify early signs of complications after the intervention. This program demonstrates that a structured, interactive, and community-based educational approach is effective in enhancing health literacy and empowering patients and their families in the management of chronic diseases such as diabetes

RECOMMENDATIONS

1. Moving forward, it is recommended to strengthen the program by incorporating more personalized approaches, such as individual counseling sessions or case-based learning, to reach participants with lower initial levels of understanding. Additionally, similar educational programs should be expanded to other communities, especially those with low health awareness, to reduce the national burden of Diabetes Mellitus complications.
2. Educate regularly in outpatient polyclinic patient services using brochures or leaflets with targets outside of the RS Kristen Mojowarno Diabetes Mellitus Club members so that the reach is wider.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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