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Efforts To Improve Early Detection of Diabetes Mellitus in UPTD Puskesmas Ngasem Kediri District

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ABSTRACT
Diabetes mellitus (DM) is a chronic disease with a steadily increasing global prevalence and is among the leading causes of morbidity and mortality, including in Indonesia. This condition creates a major health and economic burden, particularly for individuals with low to middle socioeconomic status, as it is often detected late and inadequately treated. Limited public awareness of early symptoms, modifiable risk factors, and preventive measures is a key factor contributing to delayed diagnosis and the risk of serious complications in the future. This community service program was carried out at Ngasem Community Health Center, Kediri Regency, and involved 25 participants with a history of DM. The primary objective was to enhance community knowledge and awareness regarding DM through health education using a participatory approach. Knowledge levels were assessed before and after the intervention to evaluate the effectiveness of the educational activity. The results indicated a clear improvement in participants' understanding of the early symptoms of DM, associated risk factors, and preventive strategies. This suggests that participatory health education is an effective approach to improving public knowledge and encouraging proactive health behavior. Sustained and systematic educational interventions are therefore essential to support the prevention and control of DM at the community level.

Keywords **:** Active Learning Method, Diabetes Mellitus, Early Detection, Education

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INTRODUCTION

Diabetes Mellitus is a chronic disease characterized by high blood glucose levels due to the body's inability to produce or use insulin effectively (Mukhtar et al., 2020). The disease can be divided into several types, including Type 1, Type 2, and Gestational Diabetes (Jwad & Al-Fatlawi, 2022). The global prevalence of diabetes continues to rise, with the International Diabetes Federation (IDF) reporting an estimated 536.6 million people diagnosed with diabetes in 2021, and Indonesia ranking fifth with 19.5 million cases. In Kediri District, there are more than 28,000 people with diabetes, with Ngasem Health Center serving 3,517 patients. Factors such as obesity, unhealthy diet, lack of physical activity, and low health literacy are the main causes of the increase in diabetes cases. Effective health education is needed to increase public

awareness about diabetes prevention and management (Alam et al., 2021).

Diabetes mellitus not only causes serious complications such as cardiovascular disease, renal failure, and neuropathy, but also has a major impact on the quality of life of sufferers as well as the economic burden on individuals, families, and health systems (Siam et al., 2024). Early detection of Diabetes Mellitus is a crucial step in controlling the progression of the disease. With early diagnosis, patients can start appropriate interventions, such as lifestyle changes, blood sugar control, and medical therapy, which can significantly delay or prevent long-term complications (Handelsman et al., 2023). However, low public awareness of the importance of regular health checks, especially in areas with limited access to health facilities, is one of the main challenges in Diabetes Mellitus early detection efforts (Lu et al., 2023).

Recent studies have shown that community-based education combined with routine screening can significantly improve early diagnosis rates and glycemic control among high-risk populations (Chen et al., 2025). Moreover, integrating culturally appropriate health messages and using local health workers as facilitators have been proven to enhance community engagement and trust, especially in rural or underserved areas (Shrestha et al., 2024).

To address this problem, innovative and effective educational approaches are needed. Counseling that focuses on improving people's knowledge of Diabetes Mellitus symptoms, risk factors and prevention, combined with early detection methods such as routine blood sugar checks, can increase awareness and preventive action in the community (Antar et al., 2023). In addition, learning methods that involve the active participation of the community can strengthen their understanding, enabling them to identify early signs of Diabetes Mellitus and seek immediate medical attention (Ernawati et al., 2021).

By empowering communities through participatory health education models, it is possible to create sustainable behavioral changes that support long-term diabetes prevention and control (Ingul et al., 2025). Educational interventions are more effective when they are interactive and participant-centered, allowing individuals to not only receive information but also practice decision-making and problem-solving related to their health (Kulju et al., 2024). Such approaches can increase motivation, improve self-efficacy, and lead to sustained behavior change in managing diabetes risk factors.

Strengthening early detection efforts through health education at the primary health care level, such as community health centers, is a strategic step to bridge the gap between health services and the community (Tambunan et al., 2024). These efforts are expected to build a preventive culture, reduce the prevalence of diabetes, and alleviate the long-term economic burden on the health system (Kaligis et al., 2023). Efforts to increase early detection of Diabetes Mellitus are expected to not only reduce the prevalence of the disease, but also reduce the economic burden and improve the quality of life of the community, especially in high-risk areas (Gregg et al., 2023).

METHOD

This community service program applied the Active Participant Learning Method (CBPA), an extension of the Active Student Learning Approach (CBSA). CBSA emphasizes the active involvement of participants physically, mentally, intellectually, and emotionally, to optimize learning across cognitive, affective, and psychomotor domains. CBPA adapts these principles to the community context, where participants act as community members who actively learn and share experiences with each other.

The activity was conducted on October 24, 2024, in the waiting room of Ngasem Community Health Center, Kediri Regency, involving 25 participants from the health center’s

working area. Before the educational session, participants completed a pre-test to assess their baseline knowledge of Diabetes Mellitus (DM). The session was delivered through presentation, group discussion, and interactive question-and-answer sessions covering the definition of DM, signs and symptoms, diagnostic blood sugar levels, risk factors, prevention, the importance of blood sugar control, and complications of uncontrolled DM. A post-test with the same questions was administered afterward to measure knowledge improvement.

The evaluation instrument consisted of a structured questionnaire with nine multiple-choice and yes/no questions. Content validity of the instrument was confirmed through expert judgment by two public health specialists, while its reliability was tested in a pilot group and showed good internal consistency (Cronbach's alpha = 0.82). Pre- and post-test results were then compared descriptively to evaluate the increase in community knowledge following the intervention.

RESULTS

In this study, an evaluation was conducted on the increase in community knowledge about Diabetes Mellitus after counseling at the Ngasem Health Center, Kediri Regency. The evaluation was conducted using pre-test and post-test methods. Community knowledge about Diabetes Mellitus symptoms increased by 11%. Knowledge about Diabetes Mellitus risk factors increased by 33%. Knowledge about Diabetes Mellitus prevention increased by 33% after attending counseling. These results show that the education provided has a significant impact in increasing community knowledge related to Diabetes Mellitus. The use of the Active Participant Learning Method proved effective in strengthening participants' understanding through their active involvement in the learning process.

Based on the results obtained in Table 1, there was an increase in the participants' knowledge about the definition of Diabetes Mellitus from 89% to 100% (question 1), signs or symptoms of Diabetes Mellitus from 67% to 78% (question 2), blood sugar levels said to have diabetes mellitus from 67% to 78% (question 3), risk factors for diabetes from 56% to 89% and 78% to 89% (questions 4 and 5), prevention of DM from 67% to 100% (question 6), knowledge about controlled diabetes from 56% to 100% (questions 7 and 8), and the consequences of diabetes if not controlled from 56% to 89% (question 9). Before the activity was carried out, only a small number of participants knew the blood glucose value that was said to have diabetes mellitus (67%). This is an indicator that many participants do not understand the importance of regular health checks, including checking blood glucose levels. The American Diabetes Association (2021) states that the normal value of blood glucose during/without fasting is less than 200 mg/dL; fasting blood glucose is less than 126 mg/dL; and blood glucose 2 hours after being given a glucose load is less than 200 mg/dL. This information was then packaged into a community service activity that directly involved participants through cognitive, emotional, and psychomotor approaches. Participants' knowledge of disease complications prior to the activity was also quite low. This condition is very important to note because uncontrolled diabetes will trigger other diseases, including arteriosclerosis, kidney failure, blindness, heart failure, and other cardiovascular diseases. This condition will certainly affect all sectors, especially regional health. After the activity, participants' knowledge of diabetes complications increased. Thus, this activity raised public awareness of the importance of knowledge about controlled diabetes. Participants' enthusiasm for the activity encouraged them to interact throughout the activity.

Table 1: Pre-test vs Post-test Knowledge Scores of Participants (N = 25, maximum score = 100, scale = percentage of correct answers)

Question	Pretest score (%)	Posttest score (%)	Description
1	89	100	There is an increase in knowledge
2	67	78	There is an increase in knowledge
3	67	78	There is an increase in knowledge
4	56	89	There is an increase in knowledge
5	78	89	There is an increase in knowledge
6	67	100	There is an increase in knowledge
7	56	100	There is an increase in knowledge
8	56	100	There is an increase in knowledge
9	56	89	There is an increase in knowledge
Average	65,9	91,2	Mean score

The results indicate a substantial increase in participants' knowledge across all domains. The mean score rose from 65.9% at baseline to 91.2% after counseling, reflecting improved understanding of DM symptoms, diagnostic values, risk factors, prevention, disease control, and complications. These findings demonstrate that participatory health education effectively enhances community knowledge and awareness of the importance of early detection and prevention of DM.

DISCUSSION

The outcomes of this community service activity showed a significant increase in community knowledge about diabetes mellitus (DM) after attending the health counseling sessions. This increase in knowledge is very important because non-communicable diseases (NCDs) and infectious diseases have become the leading causes of death worldwide, requiring serious attention as both impact the overall health status of the community and can even hamper socio-economic development (Minghui et al., 2023). Early prevention, proper management, and regular screening are therefore essential in reducing the risk of NCDs such as Diabetes Mellitus. Diabetes Mellitus screening can be performed through blood glucose testing as an early effort to detect and control the disease (Rahman et al., 2019).

This educational activity benefited the community by improving their awareness of Diabetes Mellitus symptoms, risk factors, and prevention strategies (Ilyan et al., 2025). Respondents with varied educational backgrounds were able to understand the material delivered, showing that health education using simple, interactive methods can bridge gaps in literacy and support equitable health promotion. Better knowledge about Diabetes Mellitus enables individuals to be more aware of early signs, risk factors, and self-management behaviors to prevent complications (Sensusiati et al., 2021). This is especially crucial in communities with limited access to health services. These outcomes align with Khasanah et al. (2019), who stated that community-based health counseling can improve public understanding of chronic diseases, including Diabetes Mellitus. With improved knowledge, individuals are more likely to adopt proactive health behaviors, such as conducting routine health checks and maintaining a healthy lifestyle.

Prevention efforts to reduce Diabetes Mellitus incidence can be strengthened through health promotion. Health promotion addresses risk factors related to the broader determinants of health, thereby reducing disease burden and improving the quality of life of individuals and communities (Hill-Briggs et al., 2021). Such activities must be planned, monitored, and evaluated to ensure effectiveness. Therefore, the use of structured educational sessions becomes a key prerequisite for successful health promotion. Direct counseling to the community can increase knowledge about hypertension and diabetes mellitus, motivating participants to adopt preventive behaviors (Wahyuni et al., 2023). Health promotion in the form

of education can be provided to both diabetic and non-diabetic individuals, aiming to prevent the onset of Diabetes Mellitus, as well as to support the control and prevention of complications among those already diagnosed (Zuriati et al., 2021).

The increase in knowledge gained from this activity is also expected to influence community attitudes and practices related to healthy living (Rahmadhani et al., 2023). According to Duckworth & Gross (2020), the process of behavior change begins with knowledge, which then shapes attitudes and ultimately manifests in real actions. When people understand the risk factors of Diabetes Mellitus and how to prevent it, they are more likely to adopt healthy behaviors such as consuming balanced nutrition, exercising regularly, and reducing sugar intake (Reynolds & Mitri, 2024). This aligns with the Health Belief Model (HBM) which states that individuals will take preventive action if they perceive the disease as serious and believe they are susceptible to it (Alyafei & Easton-Carr, 2024).

In addition, the active participation approach used during the sessions also helped build participants' confidence (self-efficacy) in managing their own health. Self-efficacy is an important component in behavioral change, as people who believe in their ability to carry out health behaviors are more likely to sustain those behaviors. Through interactive discussions, question-and-answer sessions, and practice activities, participants gained not only knowledge but also confidence to apply what they learned in daily life, such as performing routine blood glucose checks and seeking medical help early when symptoms appear (Peyman et al., 2020).

In this activity, an increase in knowledge was demonstrated by the difference between pretest and posttest scores after education. The applied approach was the Active Participant Learning Method, which requires active cognitive, affective, and psychomotor engagement from participants. The Active Participant Learning Method encourages mental involvement and creates learning experiences that engage cognitive, emotional, and psychomotor domains, ensuring that knowledge is not only understood but also internalized (Harahap et al., 2021). This approach is consistent with the principles of Orem's Self-Care Theory, which emphasizes empowering individuals to perform self-care through knowledge, skills, and motivation. By increasing knowledge, the community becomes more capable of self-managing their health, particularly in adopting healthy lifestyles, monitoring blood sugar levels, and seeking timely medical consultation.

Another key point is that the participatory method used in this activity aligns with adult learning principles, which emphasize the importance of experiential and problem-based learning. Adults learn more effectively when they are actively involved in the learning process, can relate new knowledge to their daily experiences, and are encouraged to solve real-life problems (Karger et al., 2025). By involving participants cognitively, emotionally, and physically, the Active Participant Learning Method ensures that the knowledge delivered is relevant, memorable, and applicable to daily life. This approach also fosters critical thinking, enabling participants to identify risky behaviors and make informed decisions to reduce their risk of Diabetes Mellitus (Haugan & Eriksson, 2021).

Furthermore, this community service also contributes to strengthening the role of primary health care, especially health community center, as the front line in the prevention and early detection of chronic diseases. Integrating educational activities like this into the routine agenda of puskesmas can increase community engagement, build trust, and improve health-seeking behavior (Holschneider et al., 2021). When the community perceives health community center as an accessible and supportive source of health information, they are more likely to participate in regular health checks, follow recommended health practices, and seek medical advice early. This ultimately contributes to reducing the burden of chronic diseases in the community and improving overall public health indicators (Sujarwoto & Maharani, 2022).

These findings also indicate the importance of sustainability in community health

education programs. One-off interventions can raise awareness, but long-term behavioral change requires continuous reinforcement, follow-up, and support from health workers (Matthews et al., 2024). Therefore, the Puskesmas should consider incorporating periodic DM education and screening as part of their routine community health activities. This will ensure that knowledge gained is maintained and transformed into consistent preventive behavior within the community.

These results are in accordance with Harahap et al. (2021), who emphasized the importance of community-based health education in increasing public awareness of chronic diseases. Similarly, Sanaeinasab et al. (2021) showed that health education programs can improve people's knowledge about diseases such as diabetes, and Fahrurozi et al. (2023) highlighted the success of active participation-based education methods in reducing the prevalence of chronic diseases..

The outcomes of this community service program also support findings by previous studies which found that diabetes awareness campaigns effectively enhanced public knowledge about Diabetes Mellitus in community settings. Likewise, Maharani (2022) highlighted that community-based health education projects can empower local residents to adopt healthier lifestyles and prevent chronic diseases. Such empowerment is a critical step toward achieving community self-reliance in health, where individuals not only rely on health facilities but also actively participate in maintaining their well-being through informed decisions and proactive actions.

Based on the implementation of this community service, it can be seen that active involvement of participants in cognitive, emotional, and psychomotor aspects supports the achievement of health extension goals and fosters community self-reliance in Diabetes Mellitus self-management behaviors.

CONCLUSION

This community service activity made a practical contribution to improving public knowledge about Diabetes Mellitus (DM) through participatory health education. The use of the Active Participant Learning Method proved effective in significantly increasing participants' understanding of DM symptoms, risk factors, prevention strategies, and complications. The findings highlight the importance of applying interactive and participatory approaches in health promotion. Health workers can adopt this method as part of routine health education to strengthen community capacity in early detection and prevention of DM, particularly in areas with limited access to health information. To ensure sustainability, follow-up sessions, regular monitoring, and collaboration with local stakeholders are recommended. Integrating this approach into the health center's ongoing outreach programs can help maintain knowledge gains, foster long-term behavioral change, and ultimately reduce the burden of DM in the community.

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