



Education and Application of Diabetic Foot Exercises in Ilotidea Village, Tilango Sub-District, Gorontalo Regency

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ABSTRACT

Diabetes Mellitus is a chronic disease characterized by elevated blood glucose levels and has the potential to cause various complications if not properly managed. Lack of patient knowledge about the disease and the importance of physical activity is one of the factors affecting the success of Diabetes Mellitus management. One of the non-pharmacological efforts that can be implemented is through health education and the application of diabetic foot exercises. The purpose of this activity was to improve patients' knowledge about Diabetes Mellitus and to train patients' ability to perform diabetic foot exercises independently. The

method used was health education about Diabetes Mellitus and demonstration of diabetic foot exercises followed by direct practice by participants. The results show an improvement in patients' understanding of Diabetes Mellitus as well as their ability to perform diabetic foot exercises. Most participants are able to perform the movements correctly and independently. The conclusion is that education on Diabetes Mellitus and the implementation of diabetic foot exercises are effective in improving patients' knowledge and skills as an effort for independent disease management.

1. INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease that has become a global health concern with an incidence rate that continues to rise year after year. This condition is characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (PERKENI, 2021). Nationally, the prevalence of DM in Indonesia demonstrates a significant upward trend, driven by societal lifestyle changes such as unhealthy dietary habits and physical inactivity. Consequently, DM has been designated as a priority non-communicable disease requiring comprehensive prevention and control efforts.

At the regional level, an increasing number of DM cases has also been observed in Gorontalo Province. Local health data indicate that non-communicable diseases, particularly DM, have begun to emerge as a prominent health challenge within the community. Furthermore, initial observations conducted in Ilotidea Village, Tilango Sub-district, revealed that many individuals living with DM still lack optimal understanding regarding the management of their condition, particularly concerning physical activity and foot care. This limited knowledge contributes to a low adoption of self-care practices, thereby heightening the risk of complications.

One of the frequent complications experienced by DM patients is lower extremity dysfunction resulting from compromised blood circulation and peripheral nerve damage (diabetic neuropathy) (Ministry of Health RI, 2021). This condition can manifest as tingling sensations, numbness, and non-healing diabetic foot ulcers. Physiologically, chronic hyperglycemia leads to microvascular damage (microangiopathy) and neural impairment, which diminishes blood flow to peripheral tissues. As a result, wound healing is impaired, and the risk of amputation rises if early preventive measures are not initiated.

DM management strategies must extend beyond pharmacological therapy to encompass non-pharmacological approaches, including lifestyle modification through increased physical

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activity and health education. Health education plays a pivotal role in strengthening patients' knowledge, attitudes, and behaviors, enabling them to perform optimal self-care. However, purely theoretical education often fails to produce tangible behavioral changes in the absence of hands-on practice. One recommended form of physical activity for DM patients is diabetic foot exercise. These exercises consist of simple movements designed to enhance blood circulation to the lower extremities, strengthen muscles, and maintain foot joint flexibility (Soelistijo et al., 2021). Physiologically, the movements involved in foot exercises stimulate muscle contractions that facilitate venous return, thereby improving tissue perfusion and alleviating neuropathic symptoms. Additionally, these exercises help enhance peripheral nerve sensitivity.

Numerous studies demonstrate that diabetic foot exercises offer significant benefits for DM patients. Research by Pauzi et al. (2023) showed that diabetic foot exercises significantly reduced blood glucose levels in Type II DM patients. Fitrina et al. (2024) similarly reported that diabetic foot exercises effectively reduced sensory neuropathy. Furthermore, Ustadiyah et al. (2024) indicated that these exercises improve foot sensitivity, thereby offering potential to prevent further complications. Nevertheless, most existing studies have focused primarily on clinical outcomes, whereas community-based implementations integrating health education with direct practice remain limited. In light of these conditions, a gap exists between theoretical knowledge and real-world practice within the community, specifically in Ilotidea Village. Many DM patients remain unaware of the importance of diabetic foot exercises and lack the skills to execute them correctly and independently. Therefore, an intervention that combines educational delivery with hands-on training is essential to foster lasting behavioral change.

This community outreach activity was designed to combine integrated health education with direct practice of diabetic foot exercises. Educational sessions were provided to improve patients' knowledge regarding DM and complication prevention, while the application of foot exercises aimed to build skills and foster self-care habits. Ultimately, this approach seeks to establish a causal pathway wherein heightened knowledge leads to sustained behavioral modification through regular diabetic foot exercise routines. The objective of this activity was to enhance the knowledge, skills, and self-care behaviors of Diabetes Mellitus patients in Ilotidea Village, Tilango Sub-district, Gorontalo Regency, through health education and the practical application of diabetic foot exercises, thereby contributing to the prevention of complications, particularly diabetic foot ulcers.

2. METHOD

This initiative was structured as a community service program utilizing an educational approach based on a pre-experimental design with a one-group pre-test and post-test method. This design was selected to evaluate changes in participants' knowledge and skills following the dual intervention of health education and diabetic foot exercise training. The activity targeted Diabetes Mellitus patients in Ilotidea Village, Tilango Sub-district, Gorontalo Regency, involving a total of 8 participants selected via purposive sampling. The small sample size was tailored to the limited number of eligible patients available and reflected the intensive, community-based nature of the intervention.

The inclusion criteria were: (1) patients diagnosed with Diabetes Mellitus, (2) willingness to participate in the entire series of activities, (3) ability to communicate effectively, and (4) capability to engage in light physical activity. Conversely, the exclusion criteria included: (1) patients with severe complications restricting mobility, and (2) patients who failed to complete all stages of the activity. Participant characteristics assessed included age, sex, and duration of Diabetes Mellitus diagnosis. During this stage, coordination was established with village authorities and local health personnel, alongside the preparation of educational materials regarding Diabetes Mellitus and foot exercises. Educational media included leaflets and PowerPoint presentations to facilitate participant comprehension. Additionally, research instruments were prepared, comprising a knowledge questionnaire and a foot exercise skill observation checklist.

The knowledge questionnaire was developed based on literature and management guidelines from the Ministry of Health RI and PERKENI, modified to suit the local community context. Validity testing was conducted through expert judgment, while reliability testing yielded acceptable internal consistency ($\alpha > 0.70$). The skill observation checklist assessed participants' performance in conducting foot exercises across key indicators: movement accuracy, exercise sequence, balance, and operational independence.

Implementation Stage

Pre-test: A pre-test was administered to measure baseline knowledge regarding Diabetes Mellitus prior to the intervention. Questionnaire completion was directly assisted to ensure accurate participant understanding.

Intervention: The intervention was delivered in a single session lasting approximately 40 minutes, structured as follows:

- **Health Education (± 15 minutes):** Covered definition, etiology, symptoms, complications, and management of Diabetes Mellitus, highlighting physical activity and foot care. Delivered via interactive lectures, brief discussions, leaflets, and slide presentations to optimize time efficiency.
- **Demonstration of Diabetic Foot Exercises (± 10 minutes):** The facilitators systematically demonstrated foot exercise steps, ranging from warm-up to cool-down movements, providing concise explanations for each step.
- **Direct Practice of Diabetic Foot Exercises (± 15 minutes):** Participants performed the exercises under direct supervision. Exercises were maintained at a light intensity, and participants were encouraged to continue practicing independently at home 3–4 times per week.

Post-test: A post-test was conducted immediately following the intervention to measure knowledge gains. Simultaneously, practical skills were evaluated using the observation checklist during participants' exercise execution.

Evaluation Stage

Evaluation involved comparing pre-test and post-test scores to determine knowledge improvement, alongside analyzing observation records to assess participants' ability to execute diabetic foot exercises independently. Collected data were analyzed descriptively using frequency distributions and percentages to map changes before and after intervention. In addition, simple inferential analysis using parametric or non-parametric paired tests (such as paired t-test or Wilcoxon test) was performed to determine the significance of knowledge changes. Descriptive representation was preserved to accommodate the small sample size. This program adhered strictly to ethical research principles. All participants received thorough explanations regarding the study objectives and procedures before providing written informed consent. Data confidentiality was rigorously maintained, and all information collected was utilized strictly for scientific and educational purposes. The educational and training methods referenced proven health promotion principles effective in fostering knowledge and skill acquisition for chronic disease management (Ministry of Health RI, 2020; PERKENI, 2021).

3. RESULT AND DISCUSSION

Result

Table 1. Characteristics of Respondents

Characteristic	Category	Count (n)	Percentage (%)
Age	<45 years	1	12,5
	46-59 years	4	50
	>60 years	3	37.5

Sex	Male	0	0
	Famale	8	100
Education Level	Elementary School	5	62.5
	Junior High School	3	37.5
	Senior High School	0	0
Occupation	Housewife	8	100
	Entrepreneur	0	0
	Unemployed	0	0
Duration of DM	<5 years	0	0
	>5 years	8	100

Based on Table 1, detailing respondent characteristics, the majority of participants fell within the 46–59 age range (50%), followed by those aged >60 years (37.5%), with only 12.5% under 45 years. This profile indicates that most respondents were late adults or elderly individuals—demographics carrying higher susceptibility to Diabetes Mellitus that require ongoing disease management education. All participants were female (100%), and most possessed lower formal education backgrounds (62.5% elementary school graduates and 37.5% junior high school graduates, with none attending high school). This factor directly influences health literacy and information processing, necessitating clear, tailored educational delivery. Regarding occupation, 100% of participants were housewives, indicating good availability for program engagement. Furthermore, all respondents had been living with Diabetes Mellitus for over 5 years (100%), placing them in a chronic illness phase where thorough self management knowledge is paramount to preventing long-term complications. Overall, these baseline traits characterize a vulnerable group with substantial educational needs, rendering the intervention highly relevant and targeted.

The health education session and foot exercise implementation were conducted with 8 participants, achieving 100% active attendance across all phases—from oral presentations and discussion to practical training. Participants demonstrated remarkable enthusiasm throughout the interactive sessions.

Table 2 Pre-test and Post-test Knowledge Categories

Category	Score Interval	Pre-test		Post-test	
		n	%	n	%
Good	80-100	0	0	8	100
Moderate	60-79	5	62.5	0	0
Poor	<60	3	37.5	0	0
Total		8	100	8	100

Table 2 baseline measurements showed that 5 participants (62.5%) possessed moderate knowledge, while 3 participants (37.5%) scored in the poor category. No participants demonstrated good knowledge prior to the educational delivery. Following the targeted educational intervention on DM and foot exercises, all 8 participants (100%) achieved scores within the good knowledge category on the post-test. No participants remained in the moderate

or poor categories, confirming that health education effectively enhanced overall disease understanding across the group. This marked knowledge gain was facilitated by clear, structured content delivery enriched with relatable real world examples. Additionally, the small group size allowed for personalized explanations and individual coaching. These findings align with previous research demonstrating that structured health education empowers patients to comprehend and self-manage chronic diseases like Diabetes Mellitus effectively (Adila, 2025).

Table 3 Diabetic Foot Exercise Skill Levels

Category	Score Interval	Participant Count	Percentage (%)
Good	80-100	7	87,5
Moderate	60-79	1	12,5
Poor	<60	0	0
Total		8	100

Table 3 indicates that 7 participants (87.5%) demonstrated good execution skills during diabetic foot exercises, while 1 participant (12.5%) attained a moderate skill level. This outcome underscores the effectiveness of live demonstrations paired with supervised practical application. Participants did not merely consume passive theoretical knowledge; they actively observed movement mechanics and repeated the exercises until mastering each sequence. This interactive learning dynamic boosts recall and instills self-efficacy for independent daily care (Kusumaningrum, 2022).

Discussion

These findings mirror those of Fitriana et al. (2024), who observed that diabetic foot exercises serve as an effective non-pharmacological strategy to improve sensory neuropathy in DM patients. Furthermore, Carolina et al. (2024) reported that foot exercises contribute to lower blood glucose levels among elderly diabetic patients, affirming both vascular and glycemic benefits. Sidabutar et al. (2024) reinforced these outcomes by proving that foot exercises alleviate pain in diabetic neuropathy patients, confirming multidimensional health benefits spanning circulation enhancement, pain reduction, and complication prevention.

A study by Mandalike and Pantas (2025) further revealed that routine foot exercises performed over several consecutive days significantly lower blood glucose levels. Although the majority of participants reached a high skill standard, the presence of one participant in the moderate category highlights individual variations driven by physical limitations, cognitive retention, or prior physical conditioning. Consequently, customized coaching and sustained follow-up remain vital to maximize program benefits for every individual. These insights are consistent with findings by Sari and Musta'in (2023), who established that incorporating foot exercises into nursing care plans enhances patient capacity to maintain glycemic stability. Overall, demonstration-based health education paired with practical training represents a highly impactful method for building diabetic foot exercise proficiency.

The characteristics of the participants may also have contributed to the observed improvement in knowledge and practical skills. Most participants were aged 46 years or older, had relatively low formal educational attainment, and had lived with Diabetes Mellitus for more than five years. These characteristics indicate that participants may require health information that is simple, practical, repetitive, and directly applicable to daily self-care. In this context, the use of leaflets, interactive explanations, demonstrations, and supervised practice may have facilitated comprehension and retention of information. The improvement from predominantly moderate or poor knowledge before the intervention to good knowledge in all participants after the intervention suggests that educational strategies tailored to the participants' characteristics can improve their understanding of Diabetes Mellitus management. This finding supports the

principle that effective health education should consider the participants' educational background, communication needs, and ability to translate information into practical self-care behaviors (Notoatmodjo, 2018; Adila, 2025).

The combination of health education and direct exercise practice is particularly important because knowledge alone does not necessarily result in changes in health behavior (Dewiyanti et al., 2022). In the present activity, participants were not only informed about the importance of foot care but were also shown the correct sequence of diabetic foot exercises and given the opportunity to practice under direct supervision. This approach allowed facilitators to identify and correct errors in movement, sequence, balance, and exercise technique during the session. The finding that 87.5% of participants achieved a good skill level and the remaining 12.5% achieved a moderate level indicates that experiential learning can facilitate the transition from knowledge acquisition to practical self-care skills. Repeated practice may also strengthen confidence and independence, which are important components of long-term chronic disease self-management. Therefore, community-based interventions should ideally integrate educational messages with practical demonstrations and opportunities for participants to practice the recommended behaviors rather than relying solely on lecture-based education (Zainuddin et al., 2024).

Despite the positive findings, the results should be interpreted within the context of the program design. The activity involved only eight participants who were selected purposively from a specific community, and the post-test assessment was conducted immediately after the intervention. Therefore, the improvement in knowledge and exercise skills cannot necessarily be interpreted as evidence of sustained behavioral change or long-term reduction in diabetic complications. In addition, the activity did not include objective follow-up measurements of blood glucose, peripheral sensory function, foot perfusion, or incidence of diabetic foot ulcers. Nevertheless, the high level of participant engagement and the improvement in both knowledge and practical skills provide an important basis for continuing community-based diabetic foot exercise programs. Future programs should incorporate periodic follow-up, repeated training sessions, and objective clinical assessments to determine whether improved knowledge and skills are maintained and ultimately contribute to better diabetes self-management and prevention of diabetic foot complications.

4. CONCLUSION

Health education regarding Diabetes Mellitus combined with practical diabetic foot exercise training effectively increases patient knowledge and practical skills. All participants (100%) achieved high post-test comprehension regarding DM management and successfully demonstrated independent execution of diabetic foot exercises. This dual intervention serves as a practical, low-cost promotive and preventive measure in community Diabetes Mellitus management. It is recommended that patients perform diabetic foot exercises regularly at home, supported by continuous monitoring from health workers to prevent long-term diabetic complications.

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