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Enhancing the Capacity of Elderly Caregivers in Implementing Foot Exercise as Complementary Therapy for Elderly Patients with Diabetes Mellitus

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ABSTRACT

The elderly population is susceptible to various physiological changes as a natural consequence of the aging process. One of the most prevalent health conditions among this demographic is diabetes mellitus, a chronic metabolic disorder whose incidence increases with advancing age. The Griya Lansia Karawang Service Unit in West Java is a facility providing healthcare services for the elderly. Within this unit, diabetes mellitus represents the most commonly diagnosed condition, influenced by factors including unhealthy dietary patterns, reduced physical activity, family history, and age-related physiological changes. A frequent complication among diabetic patients involves foot-related problems, known as diabetic foot. Management strategies for diabetes include health education, diabetes management, and the implementation of complementary therapies, including foot exercises beneficial for maintaining foot health and preventing complications. This community service initiative focuses on empowering elderly caregivers in implementing diabetic foot exercises at the Griya Lansia Karawang Service Unit.The implementation method consisted of lectures, discussions, and demonstrations. Six elderly caregivers participated in this study through a series of activities including meetings with service unit staff and caregivers, preparation of equipment and materials, counseling implementation, monitoring and evaluation, and administration of pre-test and post-test assessments. Results indicated an 85% increase in knowledge scores between pre- and post-training assessments. Following this activity, caregivers are expected to integrate diabetic foot exercises as a routine component of elderly care. The community service activities at the Griya Lansia Service Unit proceeded smoothly without significant obstacles, with the facility providing support by accommodating the use of their hall for activities.

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INTRODUCTION

The elderly population represents a demographic group vulnerable to physiological changes as a natural consequence of the aging process. One health condition with notably high prevalence in this group is diabetes mellitus (Milita et al., 2021). Diabetes mellitus is a metabolic disorder characterized by the body's inability to produce insulin, a hormone essential for glucose transport into cells and its storage as glycogen. This condition results in elevated blood glucose levels (hyperglycemia) accompanied by metabolic disturbances due to hormonal imbalances affecting carbohydrate, protein, and lipid metabolism. Ultimately, this state can lead to chronic complications in various organ systems (Reswan et al., 2018).

According to World Health Organization (WHO) data (2020), approximately 422 million individuals worldwide suffer from diabetes, with the majority of cases found in low- and middle-income countries. Diabetes is recorded as causing approximately 1.6 million deaths annually. Meanwhile, the International Diabetes Federation reports a significant increase in diabetes cases, rising from 7 million in 2020 to 19 million in the same year, with projections indicating continued growth to 28.6 million cases by 2024.

Based on Riskesdas 2018 results, the prevalence of diabetes mellitus (DM) in West Java Province was recorded at 1.74%, with an estimated 570,611 patients. In 2021, 46,837 individuals were diagnosed with DM, of whom 17,379 (37.1%) did not receive healthcare services meeting government standards. Data from the 2020 Health Office also indicated that DM cases among the elderly in Karawang Regency reached 139,392 cases. Preliminary study results at the Griya Lansia Karawang Service Unit, obtained through interviews and secondary data review, revealed that of 65 elderly residents, 32 were identified as having diabetes mellitus.

Optimal diabetes mellitus management plays a crucial role in disease control. Five main components comprise diabetes mellitus management: physical activity, dietary regulation, education, pharmacological therapy, and blood glucose monitoring. Implementation of these five aspects becomes more effective when supported by positive attitudes from patients (Yohanes Dion, 2021). In elderly populations, diabetes mellitus management requires a holistic approach, including complementary therapies such as foot exercises.

Foot exercise represents a recommended form of activity for elderly individuals with diabetes, aimed at improving blood circulation to optimize nutrient distribution to body tissues. Implementation of foot exercises provides various benefits, including increased muscle strength, particularly in the thigh and calf regions, blood glucose reduction, and addressing mobility issues commonly experienced by diabetic patients (Priyanto et al., 2019). This exercise consists of various movements, including seated positions with feet flat on the floor, toe movements, and other variations focusing on lower extremities. Regular foot exercise implementation, for example three times weekly with 30-minute sessions, has proven effective in blood glucose control for elderly individuals with diabetes mellitus (Nandyta Putri, 2022).

In complication prevention efforts, nurses play an important promotive role, including through education on foot exercises aimed at enhancing elderly caregiver knowledge. Accordingly, partner problems include: (1) Limited knowledge among elderly caregivers regarding care and management of elderly individuals with DM, (2) No prior socialization of complementary therapy, specifically DM foot exercises, for caregivers, (3) Suboptimal training and guidance from the Griya Lansia Service Unit to elderly caregivers. This community service activity provides solutions through more comprehensive

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assessment of training needs and provision of foot exercise training to elderly caregivers, particularly for those with diabetes. Therefore, the authors were motivated to provide complementary therapy in the form of Diabetic Foot Exercise through Empowerment of Elderly Caregivers at the Griya Lansia Karawang Service Unit.

METHODS

This community service activity was conducted in June 2025 with six elderly caregiver participants at the Griya Lansia Karawang Service Unit located at Jl. Raya Teluk Jambe No. 129, Telukjambe Timur, Karawang, West Java. Media utilized in this community service activity included an LCD projector, a laptop, speakers, leaflets, chairs, and newspapers.

This community service activity employed a one-group pretest-posttest design, where pre- and post-training assessments were compared to determine intervention effectiveness. Before intervention delivery, participants first underwent a pre-test consisting of 15 questions to assess their baseline knowledge level regarding diabetic foot exercises. After receiving educational material and participating in diabetic foot exercise practice, participants were then administered a post-test with the same number and type of questions—15 questions—to evaluate knowledge changes and training effectiveness.

The measurement instrument used in this community service was a glucometer, which had undergone validity and reliability testing. Based on research conducted by Tunnicliffe, J. E. (2024), glucometers demonstrate good validity with 94-95.1% of results within accuracy limits of ±15 mg/dL or ±15% according to ISO 15197 criteria, and high correlation values with laboratory methods ($r = 0.94$-0.97). Reliability testing also showed very good consistency, indicated by Cronbach's Alpha values > 0.90 and ICC > 0.90 ($P < 0.001$), with a coefficient of variation ranging from 5.3%-6.6%. These findings indicate that glucometers are reliable for daily monitoring, although precision remains below that of laboratory instruments.

This community service was carried out at the Karawang Elderly Home Service Unit and consisted of lectures, demonstrations, question and answer sessions, and discussions regarding the stages of the implementation method as follows:

- Preparation Stage: Discussion with the Head of the Karawang Elderly Home Service Unit and social workers regarding training and socialization of leg exercises.
- Implementation Stage: Lecture and socialization about leg exercise training for the elderly. Participants in this activity were 6 caregivers from the Karawang Elderly Home Service Unit. This community service activity was carried out for 2 days from 1:00 PM to 4:00 PM in the Elderly Home Service Unit Hall. Before starting the training, the elderly caregivers were given a pretest questionnaire about their knowledge regarding leg exercise. After completing the questionnaire, the elderly caregivers received training materials and leg exercise training. The leg exercise training was delivered by the community service team, who acted as instructors and facilitators. The caregivers were asked to practice the steps of the elderly leg exercise training. The media used in this community service activity included an LCD projector, a laptop, a speaker, and a leaflet.
- Final Stage: Simulation and practice of leg exercises. The next activity is leg exercises. This exercise is performed with a student assistant, followed by 30 minutes of rehearsal of the leg exercise steps together.

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RESULT AND DISCUSSION

Implementation of foot exercise training for caregivers (Pramuwerdha) began with a pre-test to determine participants' knowledge, skills, and understanding levels before material delivery. Pre-test results indicated that most caregivers possessed limited understanding regarding the purpose, benefits, and steps of elderly foot exercises. The average score obtained by participants fell within the adequate category, with primary weaknesses in practical skill aspects for correct movement execution. After receiving material in the form of theoretical explanations, demonstrations, and direct practice, participants were re-evaluated through post-test. Post-test results showed significant improvement. Participants' average scores increased from previous levels, with the majority falling within good to very good categories. Participants demonstrated ability to explain foot exercise benefits for the elderly, show movements with proper technique, and understand safe implementation procedures according to elderly conditions.

FIGURE 1. Demonstration of Foot Exercise Movements

Overall, comparison of pre- and post-training scores demonstrated caregiver competency improvement in cognitive (knowledge), affective (attitude and motivation), and psychomotor (skill) aspects. This proves that foot exercise training effectively increases caregiver capacity as elderly companions and potentially provides positive impact on service quality and health of accompanied elderly individuals. Changes in caregiver abilities can be identified through pretest and posttest evaluation results presented in the following table.

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TABLE 1. Pre-Test and Post-Test Results of Leg Exercise Training Participants

No	Participant Initial	Pre test-Score	Category	Post-test Score	Category	Improvement Status
1	A	55	Adequate	85	Good	Improved
2	B	60	Adequate	90	Very Good	Improved
3	E	70	Good	92	Very Good	Improved
4	G	62	Adequate	89	Good	Improved
5	H	55	Adequate	87	Good	Improved
6	J	52	Poor	82	Good	Improved

Foot exercise training results for caregivers demonstrated significant improvement in participants' knowledge, skills, and attitudes. Initially, based on pre-test results, most caregivers did not comprehensively understand foot exercise benefits for the elderly, correct movement steps, and safety principles during exercise execution. This condition is understandable given that most caregivers had not previously received structured training related to foot exercises.

Knowledge plays an important role in the occurrence. A good understanding of disease and self-management skills significantly influences patients' ability to implement self-care. Effective self-management is typically supported by strong motivation and adequate information about DM, enabling patients to maintain health conditions and regulate blood glucose levels (Mustarim et al., 2019). Knowledge deficiency is often caused by limited information access and low education levels, impacting ability and behavior in blood sugar control. Therefore, increased education is necessary to enable DM patients and their families to perform foot care and support independent disease management (Indarwati, 2019).

Following training through combined methods of lectures, discussions, demonstrations, and direct practice, clear improvement occurred in post-test results. Participants demonstrated better ability in explaining foot exercise purposes and benefits, and could practice movements according to correct procedures. This aligns with previous research by Sumarni et al. (2025) in the Journal of Language and Health, showing an average 10-point increase in elderly knowledge scores after receiving education regarding diabetic foot exercises. These findings confirm that educational interventions through discussion and demonstration effectively enhance participant understanding.

Inadequate education can affect blood sugar level increases; therefore, this service focuses on health education delivery. Education represents an effort aimed at forming health-supporting behaviors. Through health education, communities are assisted in understanding actions affecting their health conditions, particularly in regulating blood glucose levels for diabetes mellitus patients (Rahmadhani et al., 2023). Educational material provided includes explanations of DM disease progression, complications and risks, and diabetic foot exercise training beneficial for improving blood circulation and strengthening leg muscles.

Beyond knowledge and skill improvement, training also impacted caregiver attitude changes. Participants demonstrated high enthusiasm and motivation to implement foot exercises routinely in elderly care activities. This is important, given that foot exercises have proven beneficial in improving blood circulation, reducing fall risk, increasing balance, and maintaining elderly independence.

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Thus, this training successfully increased caregiver capacity as elderly companions. These results support that foot exercise training can serve as a sustainable community service program and is recommended for expansion to various other nursing homes to improve elderly quality of life through simple yet effective interventions.

Debora (2023) stated that caregiver presence in social homes holds very important roles. Therefore, interventions provided are expected to reduce elderly nurse workload. Working group formation can provide positive impact on skill improvement, knowledge, and social support for caregivers. One effort to reduce caregiver workload is through continuing education. Knowledge enhancement through this education can strengthen caregiver confidence in decision-making and care actions. Additionally, with increased confidence and decreased stress levels, care quality provided to the elderly will also be more optimal.

CONCLUSION

This training provides a positive impact by increasing participants' knowledge and skills in performing complementary therapy in the form of foot exercises. Knowledge score increases of up to 85% occurred between pretest and posttest. It is recommended that diabetic foot exercise training be conducted regularly to ensure elderly caregivers can practice correct techniques and maintain consistency in implementation.

It is expected that both institutional parties can establish sustainable cooperation in community service programs, particularly through routine training implementation, regular mentoring, and continuous evaluation regarding diabetic foot exercise application for the elderly. This cooperation is expected to strengthen elderly healthcare service quality while ensuring that community service benefits continue in the long term.

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