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Research article

The Influence of Health Education on Blood Sugar Levels and Foot Care Behavior in Diabetes Mellitus Patients

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ABSTRACT

Background: Diabetes mellitus (DM) is a long-term illness that needs serious care and can cause significant problems, such as sores on the feet. Good knowledge and behavior regarding foot care can prevent and delay potential complications. Therefore, health education regarding foot care is crucial for DM patients. This study aimed to analyse the effect of health education on blood sugar levels and foot care behaviour in diabetes mellitus patients.
Methods: This study used a literature review approach using the PRISMA protocol. The article search strategy and research questions were formulated using the PICO framework in the initial stage. Google Scholar, Garuda, and SINTA databases were used for the book search. Data analysis was conducted qualitatively.
Results: Health education effectively improves knowledge and foot care behaviour in patients with DM. This can, in turn, prevent complications such as diabetic ulcers and improve foot care behaviour (daily inspection, hygiene, footwear selection, and early help-seeking) in people with diabetes mellitus.
Conclusion: Health education has been proven effective in improving knowledge and foot care behaviour in diabetes mellitus patients, which can prevent complications such as diabetic ulcers.

I. Introduction

Chronic hyperglycaemia in type 2 diabetes mellitus (T2DM) is a significant health concern, as it leads to a range of complications, notably peripheral neuropathy and peripheral vascular disease. These conditions can severely impair blood flow and nerve function in the extremities, thereby increasing the risk of foot ulcers and, in severe cases, amputation. This makes effective blood glucose control and the prevention of foot complications paramount within clinical settings, as highlighted by the American Diabetes Association (ADA, 2025) and further supported by research conducted by Bus et al. (2024).
Foot complications in individuals with diabetes are not merely a consequence of high blood sugar levels; they are often the result of a complex interplay of factors including neuropathy, which diminishes sensation, and vascular issues that hinder healing. For instance, a person with peripheral neuropathy may not notice a small cut or blister on their foot, which can subsequently become infected due to poor blood circulation. This scenario illustrates the critical need for regular monitoring and proactive foot care practices, which encompass daily inspections, maintaining proper hygiene, and selecting appropriate footwear. These behaviours are recognised as essential components in the prevention of foot ulcers among diabetic patients (Bus et al., 2024).
Despite the clear benefits of adhering to these foot care behaviours, studies indicate that many individuals with diabetes struggle with compliance. Research by Alshammari et al. (2023) reveals a concerning trend: adherence to foot care practices and overall diabetes self-management skills is often alarmingly low. This lack of adherence significantly raises the risk of developing foot ulcers and infections, which can lead to serious health consequences. The reasons for this non-compliance can be

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multifaceted, including a lack of awareness, insufficient education about the importance of foot care, and psychological barriers such as denial or fear of complications.

To combat these issues, structured education programmes have emerged as a promising solution. Evidence suggests that such programmes can substantially enhance diabetes self-management behaviours and potentially lower blood glucose levels, thereby indirectly reducing the risk of foot complications (Hsia et al., 2022). For example, a study might implement a structured educational intervention that teaches participants about the importance of daily foot inspections, proper hygiene practices, and the selection of suitable footwear. Participants who engage in such programmes often report increased confidence in their ability to manage their diabetes and improved foot care practices.

The global burden of diabetes continues to escalate, with the 2021 Global Burden of Disease (GBD) analysis estimating that 529 million individuals were living with diabetes that year, a figure projected to rise significantly by 2050 (Ong et al., 2023). This alarming trend underscores the urgent need for comprehensive prevention and management strategies tailored to address the complexities of diabetes care. The economic burden associated with diabetes, including healthcare costs and lost productivity, further emphasises the necessity for effective interventions (IDF, 2021).

Standard recommended solutions for managing diabetes encompass a range of strategies, including lifestyle modifications, optimisation of pharmacological therapy for glycaemic control, regular glucose monitoring, patient-family education, and routine foot screening and care (ADA, 2025). Each of these elements plays a crucial role in managing the disease and preventing complications. For instance, lifestyle modifications such as diet and exercise not only aid in controlling blood sugar levels but also enhance overall health and well-being.

Educational interventions focusing on foot care have been shown to improve knowledge, self-efficacy, and actual foot care practices among individuals with diabetes. Although the quality of evidence supporting these interventions varies, the consensus is that education is a vital component of diabetes management (Alshammari et al., 2023). Other studies have highlighted significant improvements in foot care behaviours following structured educational programmes that leverage behaviour change theories and nursing approaches (Ranjbar et al., 2024). These approaches often incorporate practical demonstrations and interactive discussions, allowing participants to engage actively with the material, thereby reinforcing their learning and commitment to foot care.

Despite the wealth of research conducted in this area, there remains a pressing need for a comprehensive and critical literature review that summarises and evaluates the scientific evidence on the role of health education in shaping foot care behaviour in patients with diabetes mellitus. Such a review would provide insights into the consistency of findings across studies, assess the methodological strength of existing research, and explore the context of implementation in various healthcare settings. This analysis is crucial for identifying gaps in the current literature and for understanding how educational interventions can be optimally designed and implemented to maximise their effectiveness.

Relationship between chronic hyperglycaemia in type 2 diabetes mellitus and the risk of foot complications is a critical area of concern that necessitates focused attention from healthcare providers. By prioritising blood glucose control and robust foot care practices, the risk of developing serious complications such as foot ulcers and amputations can be significantly reduced. The implementation of structured educational programmes has the potential to enhance self-management behaviours and improve foot care practices among individuals with diabetes. As the global burden of diabetes continues to rise, it is imperative that comprehensive, evidence-based strategies are developed and disseminated to ensure that patients receive the education and support they need to manage their condition effectively. This study aims to explore the effect of health education on blood sugar levels and foot care behaviour in patients with type 2 diabetes mellitus, thereby providing a scientific basis for designing more effective and applicable interventions in health services.

II. METHODS

This study used a literature review approach by applying the PRISMA protocol to collect and analyze previous studies' findings on hypertension risk factors in young adults in Indonesia. The article search strategy and research questions were formulated using the PICO framework in the initial stage. The literature search used Google Scholar, Garuda, and SINTA databases. Search for articles using the keywords: “type 2 diabetes mellitus” AND (“health education” OR “health education” OR “self-

management") AND ("foot care" OR "foot care") AND (HbA1c OR "glycemic control") Indonesia. The inclusion criteria for this study were (1) journal articles published from 2015 to 2025, (2) articles in English or Indonesian with open access, and (3) articles published in SINTA. Exclusion criteria were (1) journal articles in the form of reviews, (2) articles published before 2015.

Two reviewers were involved in data extraction from 11 articles that met the criteria. The process began by reviewing the title and abstract, research design, measurement methods, and analysis techniques. At the analysis stage, each article was summarized, including author name, year of publication, journal name and volume, methodology, main findings, and database where the article was published. All summaries were then organized into a tabular synthesis matrix for further analysis. After that, the research questions were grouped based on key issues related to type 2 diabetes mellitus in Indonesia to sharpen the focus of the study based on the findings of the thirteen articles. Finally, an in-depth analysis of the empirical evidence, theoretical underpinnings, and conceptual perspectives behind the findings, as well as the methodological approach of each publication, was conducted; the discussion section was organized to present a comprehensive elaboration by integrating relevant theoretical frameworks as analytical footing.

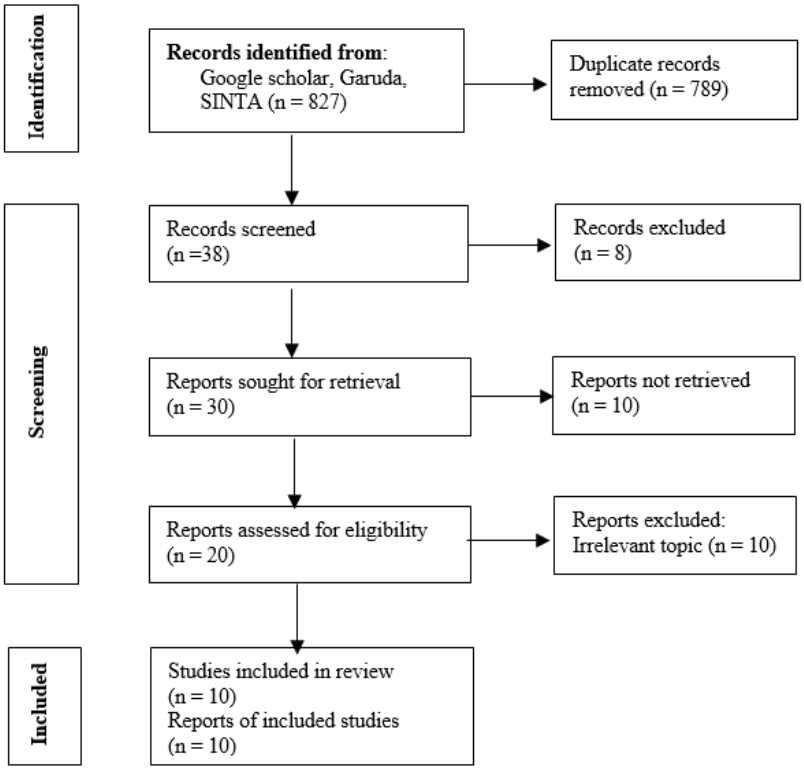

Table 1. PRISMA

III. RESULT

No	Name	Methods	Result
1	(Astuti & Juvenia, 2020)	Studi Literatur	There is a positive correlation between the level of knowledge and patient compliance behavior in carrying out foot care to prevent diabetic wounds. Effective education can improve patient knowledge, increasing compliance with foot care procedures.
2	(Sari et al., 2023)	Pre-experiment	Foot care has a significant influence on the degree of diabetic neuropathy in patients with type 2 diabetes mellitus.
3	(Muhdar et al., 2018)	Cross-Sectional study	The chance of diabetic foot ulcers was not significantly linked to the length of time

			someone had diabetes. On the other hand, how people cared for their feet was strongly related to the chance of diabetic foot ulcers.
4	(Munali et al., 2019)	Quasi-experiment	Health education is a persuasive strategy to encourage people with diabetes mellitus to take more responsibility for their health by improving their knowledge and forming positive attitudes.
5	(Latipah & Apriyanti, 2023)	Quasi-experiment	Foot self-care intervention in diabetic patients with neuropathy requires awareness and confidence in performing care. Firm intention and independence will produce more optimal results. This intervention becomes more meaningful if done independently without dependence on the assistance of health workers.
6	(Hidayat et al., 2022)	Quasi-experiment	The average pre-test score of respondents was 20.5, while the average post-test score reached 23.5. There was a significant difference in neuropathy symptoms before and after the foot care intervention, indicating that foot care effectively prevents neuropathy symptoms in patients with diabetes mellitus.
7	(Simamora et al., 2020)	Quasi-experiment	Diabetic foot exercise reduces neuropathy in patients with type 2 diabetes mellitus. Physical exercises, including diabetic foot exercises, are recommended for these patients to improve blood circulation and prevent diabetic ulcers.
8	(Djamaludin et al., 2019)	Quasi-experiment	Range of Motion (ROM) exercise on the ankle affects the prevention of neuropathy ($p = 0.000$) and angiopathy ($p = 0.000$). There were significant differences between the intervention and control groups in neuropathy ($p = 0.004$) and angiopathy ($p = 0.031$). Patients with diabetes mellitus are recommended to do ankle ROM exercises at home to prevent neuropathy and angiopathy.
9	(Kalsum et al., 2020)	-	Most respondents (93.4%) had good foot care behavior and routinely performed at home, namely, 28 people. However, the risk of ulcers in week 4 compared to week 1 increased, with two respondents (6.6%) in the moderate category and one respondent (3.4%) in the high category.
10	(Embuai et al., 2017)	Quasi-experiment	Preventing foot ulcers in people with diabetes mellitus can be achieved by education on foot care and the use of foot exercises.

IV. DISCUSSION

Diabetes is a chronic condition that has emerged as a significant global health challenge, characterised primarily by the accumulation of glucose in the bloodstream. This condition arises when the body is unable to produce sufficient insulin, a hormone crucial for regulating blood sugar levels, or when it cannot utilise insulin effectively. The consequences of poorly managed diabetes can be severe

and multifaceted, leading to a range of symptoms that include frequent urination, often accompanied by a sweet taste in the urine, which is indicative of elevated glucose levels. This phenomenon is not merely a symptom; it represents the body's struggle to maintain homeostasis in the face of metabolic dysfunction (Alkalash et al., 2024).

The World Health Organization (2021) elucidates the role of health education as a pivotal tool in combating health issues such as diabetes. Health education encompasses a series of structured learning experiences aimed at empowering individuals and communities to enhance their health outcomes. By increasing health knowledge, motivation, and literacy, health education fosters an environment where informed decisions can flourish. As highlighted by Bradley et al. (2011), the goal is not merely to impart knowledge but to inspire individuals to take proactive measures towards their health, thereby creating a ripple effect within communities.

The Centers for Disease Control and Prevention (CDC) further emphasises that health education is not a one-off event but a continuous and structured process. It provides individuals with the necessary knowledge and skills to make informed health decisions, ultimately leading to behavioural changes that benefit both personal and communal health. This structured approach is vital in addressing chronic conditions like diabetes, where lifestyle choices play a significant role in disease management and prevention.

For health professionals working with older adults, promoting proper foot care interventions is an essential aspect of diabetes management. Foot care is often overlooked, yet it is a critical component of overall health and well-being in this demographic (Wong & Morrison, 2024). The significance of foot care is underscored by research indicating that various factors, such as signs and symptoms of diabetes ($p = 0.023$), blood glucose monitoring ($p = 0.000$), and random blood glucose measurements ($p = 0.040$), significantly influence foot care behaviours. Individuals with Type 2 diabetes are particularly encouraged to enhance their blood glucose monitoring practices and foot care routines to mitigate the risk of developing diabetic foot ulcers, a serious complication that can lead to severe consequences, including amputation (Joeliantina et al., 2022).

The study further reveals that several socio-demographic factors, including educational background, financial status, previous diabetes education, frequency of follow-up examinations, and regular physical activity, significantly impact an individual's self-efficacy regarding foot care. Notably, gender has been identified as a variable influencing foot self-care practices, with evidence suggesting that it plays a role in shaping individuals' self-efficacy. A positive linear relationship has been established between foot self-care practices and levels of self-efficacy, indicating that as individuals become more confident in their ability to care for their feet, their practices improve (Sezgunsay et al., 2025).

Education on proper foot care is instrumental in empowering individuals with diabetes to enhance their self-care routines and sense of agency. Goodall et al. (2020) emphasise that through targeted education, individuals can better understand the importance of foot care and the steps necessary to maintain foot health. However, various barriers prevent optimal foot care among individuals with diabetes, whether they currently have foot ulcers or not. These barriers can be effectively addressed through the lens of the Health Belief Model, which posits that an individual's beliefs about health risks and the benefits of preventive actions significantly influence their health behaviours (Oni, 2020).

In Ethiopia, the prevalence of good diabetic foot self-care practices stands at 51% (95% confidence interval: 41% to 61%; $I2=98\%$, $p \leqslant 0.001$). Factors such as knowledge of foot care, female gender, and rural residency have been linked to improved self-care practices among individuals with diabetes (Feleke et al., 2025). This statistic underscores the importance of targeted educational initiatives that can bridge the knowledge gap and promote better self-care behaviours.

Foot care serves as a fundamental preventive measure for individuals with diabetes, particularly those with good overall health and normal blood sugar levels. Regular foot care practices aim to prevent injuries that could lead to more severe complications. As outlined by Chen et al. (2025) and Prabhath et al. (2025), effective foot care encompasses a variety of practices, including washing and maintaining foot hygiene, selecting appropriate footwear, and conducting daily inspections for any signs of redness, blisters, calluses, or ulceration. These practices are not merely recommendations; they are vital components of a comprehensive diabetes management strategy.

The actions taken to ensure foot cleanliness and prevent injuries are crucial for individuals living with diabetes. Early intervention in foot care not only protects against potential injuries but also reduces the risk of infections that could escalate to more serious health issues, including amputation (Alkalash et al., 2024). The emphasis on proactive foot care behaviours is essential, as the consequences of neglect can be dire, leading to significant morbidity and a diminished quality of life.

Diabetes is a complex and multifaceted disease that requires a comprehensive approach to management, particularly concerning foot care. Health education plays a critical role in equipping individuals with the knowledge and skills necessary for effective self-care. By understanding the importance of foot care and addressing the barriers that hinder optimal practices, individuals with diabetes can significantly improve their health outcomes. The interplay of various socio-demographic factors, along with targeted educational initiatives, can foster a culture of proactive health management, ultimately leading to better quality of life and reduced complications associated with diabetes. The commitment to foot care is not merely a personal responsibility; it is a collective endeavour that involves healthcare professionals, communities, and individuals working together to combat the challenges posed by diabetes.

V. CONCLUSION

Through health education, knowledge, and adherence to foot care, diabetic patients can improve, thus preventing complications such as ulcers. Education plays a role in increasing knowledge and leading to changes in daily habits that protect the feet.

VI. CONFLICTS OF INTEREST

No conflict of interest was found during the research

REFERENCES

ADA. (2025). 12. Retinopathy, neuropathy, and foot care: standards of care in diabetes—2025. *Diabetes Care*, *48*(Supplement_1), S252–S265.

Alkalash, S. H., Alnashri, F. H., Alnashri, A. I., Alghubayshi, K. A., Alsumaydi, M. A., Alzubaidi, W. S., Alshuqayfi, S. M., Alkudaysi, F. M., & Qusty, N. F. (2024). Knowledge, Attitude, and Practice of Adult Diabetics Regarding Diabetic Foot Ulcers: A Cross-Sectional Study in Saudi Arabia. *Cureus*, *16*(1), 1–14. https://doi.org/10.7759/cureus.53356

Alshammari, L., O'Halloran, P., McSorley, O., Doherty, J., & Noble, H. (2023). The effectiveness of foot care educational interventions for people living with diabetes mellitus: an umbrella review. *Journal of Tissue Viability*, *32*(3), 406–416.

Astuti, Y., & Juvenia, D. (2020). Pelaksanaan Edukasi Tentang Perawatan Kaki untuk Mencegah Terjadinya Ulkus pada Kaki Diabetes Millitus Tipe 2. *Jurnal Kesehatan STIKes Sumber Waras*, *2*(1), 12–17.

Bradley, R., Sherman, K. J., Catz, S., Calabrese, C., Jordan, L., Grothaus, L., & Cherkin, D. C. (2011). Survey of CAM interest, self-care, and satisfaction with health care for type 2 diabetes at group health cooperative. *BMC Complementary and Alternative Medicine*, *11*(1), 121. https://doi.org/10.1186/1472-6882-11-121

Bus, S. A., Sacco, I. C. N., Monteiro-Soares, M., Raspovic, A., Paton, J., Rasmussen, A., Lavery, L. A., & van Netten, J. J. (2024). Guidelines on the prevention of foot ulcers in persons with diabetes (IWGDF 2023 update). *Diabetes/Metabolism Research and Reviews*, *40*(3), e3651.

Chen, Y. C., Huang, Y. H., & Lee, C. H. (2025). The Relationship Between Diabetes Knowledge and Diabetes Self-Care Behaviors in Relation to Diabetes Distress in Type 2 Diabetes Mellitus: A Cross-Sectional Study in Eastern Taiwan. *Diabetes, Metabolic Syndrome and Obesity* , *18*(May), 1431–1443. https://doi.org/10.2147/DMSO.S503754

Darvishi, A., Hassani, L., Mohseni, S., & Shahabi, N. (2025). Predicting preventive self-care behaviours among type 2 diabetes based on the health belief model in Bandar Abbas city: A cross-sectional study. *BMJ Open*, *15*(1). https://doi.org/10.1136/bmjopen-2024-091420

Djamaludin, D., Setiawati, S., & Yulendasari, R. (2019). Pengaruh latihan range of motion (ROM) ankle terhadap pencegahan terjadinya neuropati dan angiopati pada klien diabetes melitus. *Holistik Jurnal Kesehatan*, *13*(3), 263–269.

Embuai, S., Lestari, P., & Ulfina, E. (2017). Pengaruh Edukasi Perawatan Kaki Dan Senam Kaki terhadap Upaya Pencegahan Risikko Foot Ulcer Pada Klien Diabetes Melitus. *Jurnal Penelitian Kesehatan Suara Forikes*, *8*(4), 180–190.

Feleke, S. F., Faris, A. M., Habtie, T. E., Atalay, A. A., Dejazmach, Z., Tesfa, N. A., & Derbew, G. (2025). Diabetic foot self-care practices and its predictors among diabetes mellitus patients in Ethiopia: systematic review and meta-analysis. *BMJ Open*, *15*(3), e092626.

Goodall, R. J., Ellauzi, J., Tan, M. K. H., Onida, S., Davies, A. H., & Shalhoub, J. (2020). A systematic review of the impact of foot care education on self efficacy and self care in patients with diabetes. *European Journal of Vascular and Endovascular Surgery*, *60*(2), 282–292.

Hidayat, R., Soewondo, P., & Irawaty, D. (2022). Pengaruh Edukasi dan Perawatan Kaki terhadap Pencegahan Luka Kaki Diabetik. *Malahayati Nursing Journal*, *4*(8), 2147–2162.

Hsia, J., Guthrie, N. L., Lupinacci, P., Gubbi, A., Denham, D., Berman, M. A., & Bonaca, M. P. (2022). Randomized, controlled trial of a digital behavioral therapeutic application to improve glycemic control in adults with type 2 diabetes. *Diabetes Care*, *45*(12), 2976–2981.

IDF. (2021). *Diabetes Atlas, 10 TH Edition*.

Joeliantina, A., Proboningsih, J., Anugrahini, H. N., & Mejilla, J. L. (2022). The behavior of patients with Type 2 diabetes mellitus in monitoring blood glucose levels and foot care: A cross-sectional, community-based study. *International Journal of Advanced Health Science and Technology*, *2*(2), 104–109.

Kalsum, U., Astrid, A., & Jumari, J. (2020). Penerapan Program Edukasi Perawatan Kaki (3STEPFUN) Dalam Meningkatkan Perilaku Merawat Kaki Untuk Pencegahan Ulkus Diabetikum Pada Pasien Diabetes Mellitus Tipe 2 Di Aliansi Rumah Sakit Islam Jakarta Tahun 2019. *Jurnal Bidang Ilmu Kesehatan*, *10*(2), 151–159.

Latipah, S., & Apriyanti, F. (2023). Pengaruh foot self-care terhadap neuropati perifer pada pasien dm tipe 2 dengan pendekatan teori keperawatan orem. *Prosiding Simposium Nasional Multidisiplin (SinaMu)*, *4*, 1–5.

Muhdar, R., Siwu, J., & Katuuk, M. E. (2018). Hubungan lama menderita danperawatan kaki diabetes dengan resiko ulkus kaki diabetik di klinik husadasario manado. *Ejournal Keperawatan (E-Kp)*, *6*(2).

Munali, M., Kusnanto, K., Nihayati, H. E., Arifin, H., & Pradipta, R. O. (2019). Edukasi Kesehatan: Perawatan Kaki terhadap Pengetahuan, Sikap dan Tindakan Pencegahan Ulkus Kaki Diabetik. *Critical Medical and Surgical Nursing Journal (CMSNJ)*, *8*(1), 23–30.

Ong, K. L., Stafford, L. K., McLaughlin, S. A., Boyko, E. J., Vollset, S. E., Smith, A. E., Dalton, B. E., Duprey, J., Cruz, J. A., & Hagins, H. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, *402*(10397), 203–234.

Oni, D. (2020). Foot self-care experiences among patients with diabetes: a systematic review of qualitative studies. *Wound Management and Prevention*, *66*(4), 16–25.

Prabhath, S., Ramanathan, H. P., Kamath, M. G., Karkada, G., Handady, G., Mohammed, C. A., & Maiya, A. G. (2025). Development and validation of an interprofessional collaborative educational module on the self-management of foot for individuals with type II diabetes mellitus in India. *F1000Research*, *13*, 386. https://doi.org/10.12688/f1000research.146943.4

Ranjbar, F., Karimi, M., Zare, E., & Ghahremani, L. (2024). The effect of educational intervention based on the behavioral reasoning theory on self-management behaviors in type 2 diabetes patients: a randomized controlled trial. *BMC Public Health*, *24*(1), 1761.

Sari, S. P., Hastuti, T. P., Hastuti, T. P., Supriyatno, H., & SARI, S. P. (2023). *Pengaruh Perawatan Kaki Terhadap Tingkat Neuropati Diabetik Pada Pasien Dengan Diabetes Mellitus Tipe 2 Di Puskesmas Magelang Utara*.

Sezgunsay, E., Urkan, M., & Deveci, M. (2025). Diabetic foot care behavior and self-efficacy levels in individuals with diabetic foot ulcers in Turkey. *Journal of Tissue Viability*, *34*(2), 100885.

Simamora, F. A., Siregar, H. R., & Hidayah, A. (2020). Pengaruh Senam Kaki Diabetik terhadap penurunan neuropati pada penderita diabetes melitus tipe 2. *Jurnal Education and Development*, *8*(4), 431.

Wong, Y.-T., & Morrison, S. C. (2024). Health promotion models for improving footcare in older adults: a scoping review. *Gerontology*, *70*(8), 785–800.