Journal Getsempena Health Science Journal
Volume 4, Number 2, 2025 pp. 208-215
P-ISSN: - E-ISSN: 2964-4402
Open Access: https://ejournal.bbg.ac.id/ghsj

# THE EFFECT OF DIABETIC FOOT EXERCISES ON REDUCING BLOOD SUGAR LEVELS IN DIABETES MELLITUS PATIENTS IN ACEH: A CASE STUDY

**Fakruddin*[1], Aulia akmal[2], Rudi Alfiandi[3]**
[1,2]*Academy of Nursing Kesdam Iskandar Muda Banda Aceh,Indonesia,*

* Corresponding Author: *fakruddin.dafa@gmail.com*

**ARTICLE INFO**

***Article history:***
Received : Jun 17, 2025
Revised : Jul 15, 2025
Accepted : Jul 22, 2025
Available online : Jul 30, 2025

***Keywords:***
*Diabetes Mellitus, Blood Sugar Level, Diabetic Foot Gymnastics*

**ABSTRAK**

Diabetes mellitus is a chronic metabolic disorder characterized by impaired insulin production or function, resulting in persistent hyperglycemia. This condition can lead to serious complications and negatively impact patients' quality of life. Among various non-pharmacological approaches, diabetic foot exercises have emerged as a simple, effective, and accessible method for managing blood glucose levels. This study aims to evaluate the effectiveness of diabetic foot exercises in reducing blood glucose levels and assess their potential for community-level implementation. A descriptive case study design was used, involving two subjects with elevated blood glucose and cholesterol levels. The intervention was carried out over seven consecutive days in a rural village in Aceh. Data were collected through structured interviews and direct observation before and after the intervention, using assessment forms, observation sheets, and standard operating procedures for glucose monitoring. The results showed a significant decrease in blood glucose levels in Subject I, from 342 mg/dL to 280 mg/dL, and a marked reduction in cholesterol levels in Subject II, from 214 mg/dL to 74 mg/dL. The exercises are believed to stimulate lower limb muscle activity, increasing energy demand and promoting glucose uptake through metabolic pathways such as glycogenesis. Due to their simplicity, low cost, and ease of implementation, diabetic foot exercises present a promising alternative therapy, especially in resource-limited settings. Patient adherence and health education are critical to the success of this intervention. These findings support the inclusion of diabetic foot exercises in community-based diabetes management programs and contribute valuable insights for future public health strategies.



## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disease characterized by elevated blood glucose levels (hyperglycemia) due to impaired insulin production by the pancreas, insulin resistance, or a combination of both. This condition causes the body to be unable to

effectively regulate blood sugar levels, potentially leading to various serious acute and chronic complications.

Diabetes is one of the major non-communicable diseases (NCDs) worldwide and is a leading cause of mortality and disability. Patients with diabetes often face challenges in managing their condition, including suboptimal awareness of the importance of sustained blood glucose control. There remains a misconception in the community that diabetes can be cured with just a single examination or brief treatment (Khavitasari, 2024). However, diabetes requires long-term management involving lifestyle changes, medication, and non-pharmacological interventions for effective disease control. Clinically, diabetes presents with several characteristic symptoms that serve as early indicators of metabolic disturbances. Polyuria (frequent urination), especially at night, is a primary symptom caused by high blood glucose levels exceeding the renal threshold, resulting in glucose loss through urine. This condition triggers polydipsia, or excessive thirst, as the body attempts to compensate for fluid loss. Additionally, patients experience polyphagia, an increased appetite, due to the inability of cells to effectively utilize glucose as an energy source (Lestari & Zulkarnain, 2021).

According to the International Diabetes Federation (IDF, 2022), the global prevalence of diabetes among individuals aged 20-79 years has reached 10.5%, approximately 536.6 million people. This figure is projected to rise to 12.2% or 783.2 million people by 2045. The prevalence is relatively balanced between males and females, with the highest incidence in the 75-79 age group. Significant disparities also exist between urban (12.1%) and rural populations (8.3%), as well as between high-income (11.1%) and low-income countries (5.5%).

In Indonesia, the Basic Health Research Survey (Riskesdas, 2022) reported an increase in diabetes prevalence to 9.5% among individuals aged 15 years and older. Regionally, data from the Aceh Health Office (2021) indicates that diabetes mellitus ranks as the second most common non-communicable disease in Aceh, with cases continuing to rise to 154,889 in 2023 (Aceh Health Office, 2023). This situation highlights the critical need for comprehensive diabetes prevention and management efforts at the local level.

Diabetes management not only relies on pharmacological therapy but also demands a holistic approach that includes lifestyle modifications and non-pharmacological interventions. One such method gaining attention is diabetic foot exercise therapy. This exercise is specifically designed to improve blood circulation, strengthen the muscles of the feet, and help regulate blood glucose through controlled physical activity. Diabetic foot

exercise is considered a practical, cost-effective method that patients can perform independently at home or within their communities.

This study aims to evaluate the effectiveness of diabetic foot exercise therapy in reducing blood glucose levels among patients with diabetes mellitus in Aceh. With supporting scientific evidence, it is expected that diabetic foot exercise can become a recommended intervention within community diabetes management programs. Furthermore, this research hopes to raise public awareness about the importance of physical activity as an integral part of diabetes control and prevention of more severe complications.

Through non-pharmacological approaches like diabetic foot exercise, patients are encouraged to take a more active role in managing their health independently, thereby improving their quality of life and reducing the healthcare burden on society. This approach also aligns with government efforts to optimize primary healthcare services and promotive-preventive strategies focused on community empowerment.

## RESEARCH METHODS

This study is a descriptive research employing a case study approach. The case study method is a research strategy used to conduct an in-depth analysis of a particular issue or phenomenon by addressing key questions such as "what," "how," and "why." This method is particularly suitable when the researcher aims to gain a comprehensive understanding of a single case or multiple related cases involving contemporary phenomena, thereby providing a more detailed and contextualized insight (Yusuf, 2015).

In data collection, this study combines several techniques, including anamnesis, observation, and physical examination. Anamnesis was conducted through direct interviews with diabetes mellitus patients or their families to gather information regarding the patient's health status, medical history, and their experiences in managing blood glucose levels. Observation was used to monitor the implementation of diabetic foot exercise therapy directly, while physical examinations were performed to assess the overall physical condition of the patients.

The primary objective of this study is to evaluate the effectiveness of diabetic foot exercise therapy in reducing blood glucose levels in patients with diabetes mellitus. Utilizing the case study approach, this research aims to provide empirical evidence

regarding the benefits of this non-pharmacological intervention, which can serve as an alternative or complementary strategy in diabetes management.

Several instruments were employed to support data collection in this study. These included assessment sheets used to document the initial data and the progress of the patients' conditions, standard operating procedures (SOP) that guided the therapy implementation and blood glucose measurement to ensure consistent and valid results, and informed consent forms as proof of patients' agreement to participate in the research. Additionally, observation sheets were used to record findings during the therapy sessions. The study also utilized print media, such as newspapers, as supplementary sources of information, and glucometers as the primary tool for accurately measuring patients' blood glucose levels.

## RESULTS AND DISCUSSION

### Results

**Table 1.** The results of the diabetic foot exercise intervention before and after implementation in Subject I

| No | *Subject 1* | *Before (H1)* | *After (H7)* |
|---|---|---|---|
| 1 | Diabetic foot exercise intervention | 342 mg/dl | 280 mg/dl |

Based to Table 1, The evaluation results before and after the diabetic foot exercise therapy on Subject I showed that the initial blood glucose level was 342 mg/dL. After undergoing diabetic foot exercise therapy once daily for seven consecutive days, the final blood glucose level decreased to 280 mg/dL**.**

**Table 2.** The results of the diabetic foot exercise intervention before and after implementation in Subject 2.

| No | *Subject 2* | *Before (H1)* | *After (H2)* |
|---|---|---|---|
| 1 | Diabetic Foot exercise Intervention | 214 mg/dl | 74 mg/dl |

Based on Table 2,There was a gradual decrease in blood glucose levels in Subject II from day one through day seven, with a final blood glucose level of 74 mg/dL. The results of this study on the implementation of diabetic foot exercises in lowering blood glucose levels in Subject II, who has diabetes mellitus, showed a significant reduction in blood glucose levels. This decrease was observed in both subjects before and after undergoing the diabetic foot exercise intervention.

## DISCUSSION

Based on the findings of this study examining the reduction of blood glucose levels in patients with Diabetes Mellitus through diabetic foot exercises, a significant decrease in blood glucose levels was observed following the intervention. The diabetic foot exercise therapy proved to be an effective non-pharmacological method for clinically managing blood glucose levels. Subject I demonstrated a reduction in blood glucose from 342 mg/dl to 280 mg/dl, while Subject II experienced a more pronounced decrease from 214 mg/dl to 74 mg/dl after undergoing the therapy. These results underscore the potential of diabetic foot exercises as a valuable adjunct treatment in diabetes management.

The primary mechanism behind the effectiveness of diabetic foot exercises is believed to be the stimulation of muscles in the lower extremities during the activity. Continuous muscle movement increases energy demand, prompting the body to utilize glucose through glycogenesis, thereby directly lowering circulating blood glucose levels. These findings align with the study by Indriani et al. (2023), which reported a significant decrease in blood glucose levels in diabetic patients following diabetic foot exercises, from 266 mg/dl to 130 mg/dl, with an average reduction of 56 mg/dl, further validating the efficacy of this intervention.

The success of the intervention was also influenced by supporting factors such as patient adherence and educational background. Adherence emerged as a critical factor in consistently performing the foot exercise therapy for seven consecutive days in the morning, resulting in significant improvements in blood glucose levels for both subjects. Consistent therapy application is essential for achieving optimal outcomes. Fatimah (2017) emphasized that the proper and timely execution of diabetic foot exercises is crucial to avoid triggers that may elevate blood glucose.

Moreover, education plays a vital role in enhancing patients' understanding of diabetes and the importance of foot exercises in blood glucose control. The subject with higher educational attainment demonstrated better comprehension and application of health education. Mulyanti (2022) stated that adequate knowledge facilitates information processing and supports adherence through effective health education.

This study also identified several risk factors contributing to elevated blood glucose levels, including age, dietary habits, stress, and lifestyle. Older age increases the risk of hyperglycemia due to declining pancreatic function in insulin production, consistent with Perkeni (2020), who noted the highest diabetes prevalence in individuals aged 40 and above.

The dietary patterns of both subjects, characterized by high sugar and fat intake, also contributed to elevated glucose levels. Regular consumption of sugary and fatty foods such as donuts, fried snacks, and sweetened beverages accelerates blood glucose spikes and heightens the risk of severe health complications, as highlighted by Widyastuti (2018).

Psychological stress was another significant factor influencing blood glucose levels. The subject experiencing substantial stress reported elevated glucose levels, attributable to cortisol release that disrupts glucose regulation and triggers a fight-or-flight metabolic response. Yasa (2017) explained that chronic stress can precipitate diabetes through hormonal mechanisms that increase glucose release into the bloodstream.

Physical inactivity was also identified as a key risk factor. Both subjects exhibited sedentary lifestyles, adversely impacting glucose control, particularly in type 2 diabetes patients. Puspita (2020) emphasized that unhealthy lifestyles—including poor diet, physical inactivity, stress, and smoking—are major contributors to diabetes pathogenesis.

Genetic factors also played a role, with Subject II having a family history of diabetes mellitus. This finding corroborates Agustina and Bambang (2015), who reported that genetic predisposition and family history significantly elevate the risk of type 2 diabetes. Purwati (2023) further noted that genetic mutations affecting insulin production and regulation contribute to diabetes susceptibility.

In summary, this study demonstrates that the routine application of diabetic foot exercises for seven consecutive days yields significant reductions in blood glucose levels among patients with Diabetes Mellitus. Therefore, diabetic foot exercises can be considered an effective and practical non-pharmacological intervention for blood glucose management and improving the quality of life in diabetic patients.

## CONCLUSION

Based on the findings from the case study involving two subjects with diabetes mellitus, it is evident that diabetic foot exercises have a positive effect on reducing blood glucose levels. Subject I showed a decrease in blood glucose from 342 mg/dL prior to the intervention to 280 mg/dL after completing the diabetic foot exercise regimen. Similarly, Subject II experienced a significant reduction from 214 mg/dL to 74 mg/dL following the therapy. These results indicate that diabetic foot exercises can be an effective complementary therapy in managing blood sugar levels in individuals with diabetes mellitus.

Several factors contributed to the success of the intervention. Key among these

were the subjects' adherence to the exercise program, their educational background, and their ability to maintain healthy lifestyle habits such as proper nutrition and consistent sleep patterns. These elements appear crucial in maximizing the benefits of non-pharmacological therapies like diabetic foot exercises.

Conversely, factors such as dietary habits, age, and psychological stress were identified as contributors to elevated blood glucose levels. This highlights the multifactorial nature of diabetes management and underscores the need for a holistic approach that addresses not only physical activity but also diet, mental well-being, and lifestyle modifications.

Based on these findings, it is strongly recommended that diabetic foot exercise therapy be integrated as a routine part of diabetes management programs, especially in community health settings where access to medication may be limited. Healthcare providers should emphasize patient education and support to improve adherence, which is critical for achieving optimal outcomes. Furthermore, public health initiatives should aim to raise awareness about the importance of balanced nutrition, stress management, and regular physical activity alongside therapeutic exercises.

For future research, it is suggested to expand the sample size and duration of the intervention to further validate the effectiveness of diabetic foot exercises and explore additional benefits such as improvements in circulation, neuropathy symptoms, and overall quality of life.

In conclusion, diabetic foot exercises represent a promising, low-cost, and practical non-pharmacological intervention that can significantly aid in controlling blood glucose levels and improving health outcomes for individuals with diabetes mellitus.

## DAFTAR PUSTAKA

Dinkes Aceh. 2023. Profil Kesehatan Aceh 2023. Fatimah, R. N. (2015). Diabetes Mellitus tipe 2.*Jurnal Kedokteran Universitas Lampung*.4(5). 93-10.

IDF. (2022). IDF Diabetes Atlas Eighth edition 2022. In *International Diabetes Federation. IDF Diabetes Atlas, 8th edn. Brussels, Belgium: International Diabetes Federation,2022.http://www.diabetesatlas.org*.https://doi.org/http://dx.doi. org/10.1016/S0140-6736(16)31679-8.

Indriyani, E., Ludiana, L., & Dewi, T. K. (2023). Penerapan Senam Kaki Diabetes Melitus Terhadap Kadar Glukosa Darah Pada Penderita Diabetes Mellitus Di Puskesmas Yosomulyo. *Jurnal cendikia muda*, *3*(2), 252-259.

Khavitasari, D. (2024). *Asuhan Keperawatan pada Keluarga Tn. H dengan Ny. J yang Mengalami Diabetes Melitus di Dusun Karangtalun, Karangtalun, Imogiri, Bantul, Yogyakarta* (Doctoral dissertation, STIKES Notokusumo Yogyakarta).

Lestari, L., & Zulkarnain, Z. (2021, November). Diabetes Melitus: Review etiologi, patofisiologi, gejala, penyebab, cara pemeriksaan, cara pengobatan dan cara pencegahan.In *ProsidingSeminar Nasional Biologi* (Vol. 7, No. 1, pp. 237-241).

Mulyanti, S., & Astuti, A. B. (2022). Studi Deskriptif Persepsi Faktor Determinan Dan Upaya mengonotrol diabetes mellitus Di Wilayah Kerja Puskesmas Karanganom Klaten. *KOSALA: Jurnal Ilmu Kesehatan*, *11*(1), 1-13.

Perkeni. (2015). Consensus pengelolaan dan pencegahan diabetes mellitus tipe 2 di Indonesia. Jakarta. PB PERKENI.

Purwati, R., Warsono, W., & Cahyadin, A. (2023). Upaya Meningkatkan Problem Solving Skills Melalui Penerapan Modul Mutasi Genetik Berbasis Creative Problem Solving Pada Siswa Ipa Sma. *Bioed: Jurnal Pendidikan Biologi*, *11*(1), 19-29.

Puspita, T., Sulhan, M. H., Latifah, L., Rohimah, N., Arumandana, D., & Taufik, M. (2020). Peningkatan Tingkat Pengetahuan Anggota Keluarga Terkait Bahaya Merokok dan Hubungannya Dengan Hipertensi Melalui PenyuluhanKesehatan. *Jurnal Pengabdiaan Masyarakat Kasih (JPMK)*, *1*(2), 68-75.

Widyastuti, D. A. (2018). Pengaruh kebiasaan konsumsi junk food terhadap kejadian obesitas remaja.

Yasa, IWM (2017). Pengaruh Konflik Peran Dan Ambiguitas Peran Terhadap Kinerja Pegawai Melalui Mediasi Stres Kerja Pada Dinas Kesehatan Kota Denpasar Bali. *Jurnal Ekonomi dan Bisnis Jagaditha* , *4* (1), 38-57.