



Optimizing Glycemic Control through Multidisciplinary Care: A Case of Type 2 Diabetes Mellitus with Foot Ulceration

Akhmad Kheru¹, Novi Amin Juraini², Khaula Azzahra Muslihah Dien², Kirana Dwi Rahayu², Komang Angel Ayudya², Laeli Resti Oktapiani^{1*}, Lattifah Anggun², Yuri Nurdiantami³

¹ Faculty of Medicine, Malahayati University Bandar Lampung, Indonesia

² Medical Study Program, Malahayati University Bandar Lampung, Indonesia

³ Graduate School of Comprehensive Human Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan

* Correspondence: laeliresti003@gmail.com

Article History

Received : 02 January 2025
 Revised : 08 February 2025
 Accepted : 10 March 2025
 Available Online : 15 April 2025

Keywords:

type 2 diabetes mellitus;
 hyperglycemia;
 multidisciplinary care;
 foot ulceration;
 lifestyle modification;
 psychosocial support.

To cite this article: Kheru, A., Juraini, N. A., Dien, K. A. M., Rahayu, K. D., Ayudya, K. A., Oktapiani, L. R., Anggun, L., & Nurdiantami, Y. (2025). Optimizing Glycemic Control through Multidisciplinary Care: A Case of Type 2 Diabetes Mellitus with Foot Ulceration. *Biomedical Research and Theory Letters*, 1(1). 14-17. <https://doi.org/10.58524/brtl.v1i1.68>

Abstract

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by impaired insulin secretion or resistance, which frequently remains undiagnosed until complications develop, and persistent hyperglycemia contributes to multisystem damage, particularly involving vascular, neural, renal, and integumentary systems, with major risk factors including family history, obesity, unhealthy dietary patterns, and physical inactivity; in this context, a 63-year-old woman presented with blistering lesions on the left hallux accompanied by swelling, pain, and paresthesia, with a medical history of hypertension, irregular eating habits, insufficient physical activity, and a familial predisposition to diabetes, while physical examination revealed a body mass index of 26.84 kg/m² with stable vital signs, and random blood glucose was 328 mg/dL, confirming severe hyperglycemia and establishing the diagnosis of T2DM, for which management encompassed pharmacological therapy (metformin, glimepiride, amlodipine, antibiotics, analgesics), patient education, psychosocial support, and lifestyle modification, and following comprehensive intervention the patient demonstrated improved disease awareness, enhanced family support, and better adherence to lifestyle changes, with outcomes emphasizing stabilization of glycemic levels, prevention of further complications, and improvement in overall quality of life, thereby underscoring the significance of a multidisciplinary approach in T2DM management that integrates medical therapy, education, psychosocial support, and behavioral as well as environmental modifications, and highlighting that such comprehensive strategies are essential to achieve optimal glycemic control and reduce the risk of long-term complications, while also illustrating the clinical relevance of early detection and holistic intervention in patients with diabetes who present with foot lesions, since these manifestations often indicate advanced disease progression and require coordinated care to prevent disability and improve prognosis, and ultimately this case contributes to the growing evidence that effective diabetes management must extend beyond pharmacological treatment to encompass patient-centered education, psychosocial reinforcement, and lifestyle restructuring, thereby offering a model of integrated care that can be applied more broadly in clinical practice to enhance outcomes in individuals living with T2DM.



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1. Introduction

Diabetes mellitus (DM) is a chronic disease characterized by impaired insulin secretion or resistance to insulin action, resulting in persistent hyperglycemia. Insulin is the primary hormone responsible for regulating blood glucose levels, and its deficiency or the body's inability to utilize it effectively leads to multisystem damage (Migdalis, 2024). Uncontrolled hyperglycemia can damage blood vessels, nerves, kidneys, and skin, thereby increasing the risk of both macrovascular and microvascular complications. These complications are often progressive and impose a significant burden on public health systems worldwide (Chen et al., 2024). The symptoms of diabetes may appear suddenly, particularly in type 1 diabetes, whereas in type 2 diabetes they are often milder and develop gradually over several years. Classic symptoms include polyuria, polydipsia, polyphagia, weight loss, fatigue, and blurred vision (Bellou et al., 2018).

Long-term complications of diabetes include coronary heart disease, stroke, kidney failure, diabetic retinopathy, and peripheral neuropathy. Retinopathy is a leading cause of blindness among working-age adults, while neuropathy often results in diabetic foot ulcers that carry a high risk of amputation (Meloni et al., 2024). Type 1 diabetes is an autoimmune disease in which the immune system attacks pancreatic β -cells, halting insulin production. The accumulation of glucose in the blood leads to dehydration, tissue damage, and diabetic ketoacidosis

(Ismail et al., 2021). Type 2 diabetes is more complex, involving insulin resistance and relative insulin deficiency. Risk factors include family history, obesity, unhealthy dietary habits, and physical inactivity (Bellou et al., 2018).

The diagnosis of diabetes is established according to international criteria: fasting plasma glucose ≥ 126 mg/dL, 2-hour plasma glucose ≥ 200 mg/dL after an oral glucose tolerance test (OGTT), HbA1c $\geq 6.5\%$, or random plasma glucose ≥ 200 mg/dL in the presence of classic symptoms (Migdalis, 2024). In addition to classic symptoms, patients may experience weakness, pruritus, erectile dysfunction in men, and vulvar pruritus in women. These clinical manifestations reinforce the importance of early detection to prevent advanced complications (Ismail et al., 2021).

Management of type 2 diabetes does not always require medication, but in many cases pharmacological therapy such as metformin, sulfonylureas, or SGLT-2 inhibitors is necessary. Additional treatments include antihypertensive drugs and statins to reduce cardiovascular risk (Bain et al., 2024). Comprehensive care also involves routine eye examinations to detect retinopathy, kidney disease screening, and foot care to prevent ulcers and amputations (Bouly et al., 2024). A multidisciplinary approach has proven effective in improving glycemic control, combining medical therapy, patient education, psychosocial support, and lifestyle modification (Tavasoli & Larijani, 2024).

Team-based interventions involving physicians, nurses, nutritionists, psychologists, and social workers can enhance patient adherence and overall quality of life (Andersen et al., 2023). Beyond medical aspects, family and community support play a crucial role in successful diabetes management. Continuous education and patient empowerment are key strategies to reduce the burden of disease (Mbela et al., 2024). Globally, the prevalence of diabetes continues to rise, with more than 588 million adults living with the disease in 2024, and projections estimating 853 million cases by 2050.

The objective of this study is to emphasize the importance of a multidisciplinary approach in the management of diabetes mellitus, particularly in cases complicated by diabetic foot ulcers. It is expected that comprehensive strategies encompassing medical therapy, education, psychosocial support, and lifestyle modification will improve glycemic control, prevent long-term complications, and enhance patients' quality of life.

2. Materials and Methods

This study employed a holistic case-based approach to evaluate and manage a 63-year-old female patient presenting with diabetic foot complications and uncontrolled hyperglycemia. Data collection included patient history, physical examination, and laboratory investigations. The patient's personal, clinical, psychological, functional, and social aspects were assessed systematically to establish a comprehensive diagnosis.

Medical intervention consisted of pharmacological therapy tailored to the patient's condition and body weight, including metformin (2 \times 500 mg/day after meals), glimepiride (1 \times 2 mg/day before breakfast), amlodipine (5 mg/day at night), amoxicillin (500 mg three times daily), mefenamic acid (500 mg three times daily), and dexamethasone (0.5 mg three times daily). Patient education was provided regarding medication adherence, dietary regulation, and lifestyle modification. Metformin and glimepiride are widely used in elderly patients with type 2 diabetes, with evidence supporting their effectiveness in reducing blood glucose levels when carefully monitored (Siswidiyasari et al., 2025; Mannucci, 2021).

Psychosocial intervention involved psychoeducation, stress management, self-efficacy enhancement, and family-based support strategies. Group therapy and counseling modules were introduced to reduce anxiety and improve coping mechanisms. Systematic reviews confirm that psychosocial interventions significantly reduce diabetes distress and improve adherence (Pascoe et al., 2017; Yap et al., 2024).

Social and economic interventions included guidance on accessing subsidized healthcare services, counseling on flexible work arrangements, and education on maintaining a healthy lifestyle. Environmental modifications were recommended to improve home cleanliness, air quality, and access to exercise facilities. Integrated care models emphasize the importance of addressing social determinants of health to improve diabetes outcomes (Oliveira et al., 2024).

Follow-up monitoring included regular blood glucose checks, blood pressure measurements, and functional assessments. Additional laboratory tests (fasting blood glucose, postprandial glucose, and HbA1c) were recommended to evaluate long-term glycemic control. Evidence shows that integrated diabetes care interventions improve clinical outcomes when endocrinologists and multidisciplinary teams are actively involved (Zarora et al., 2022; Meloni et al., 2024).

3. Results and Discussion

Following the holistic intervention, the patient demonstrated improved clinical and psychosocial outcomes. Random blood glucose levels decreased progressively after initiation of pharmacological therapy, with stabilization observed during follow-up visits. The patient reported reduced pain and swelling in the affected toe, with improved wound healing after adherence to antibiotic therapy and proper wound care. Multidisciplinary team approaches have been shown to reduce major adverse limb events in patients with diabetic foot ulcers (Meloni et al., 2024; Zhang et al., 2025). Psychologically, the patient exhibited reduced anxiety and stress, with greater confidence in managing her disease. Family support and psychoeducation enhanced treatment adherence and reduced feelings of isolation. Functionally, the patient's activity level improved, with decreased fatigue and better tolerance for daily household tasks. Meta-analyses confirm that psychosocial interventions improve quality of life and reduce depression in patients with diabetes (Xie & Deng, 2017; Pascoe et al., 2017).

Socially, the patient gained awareness of available healthcare subsidies and expressed willingness to engage in community-based health programs. Lifestyle modifications, including reduced consumption of sugary drinks and improved dietary patterns, were reported. Environmental adjustments at home contributed to better comfort and reduced risk of recurrent infections. Social prescribing interventions have been found to improve health behaviors and economic outcomes in type 2 diabetes patients (Oliveira et al., 2024). Overall, the integrated management approach resulted in stabilization of glycemic levels, improved wound healing, enhanced psychosocial well-being, and better quality of life. The findings highlight the importance of multidisciplinary interventions in managing diabetes mellitus with foot complications, emphasizing that medical, psychosocial, and environmental strategies must be combined to achieve optimal outcomes. Systematic reviews of

integrated diabetes care confirm that such approaches improve glycemic control and reduce complications (Cooper et al., 2024; Zarora et al., 2022).

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from decreased insulin secretion by pancreatic β -cells, impaired insulin utilization due to insulin resistance, or a combination of both mechanisms. The disease affects multiple organ systems and often remains undiagnosed until complications arise, which explains its reputation as a “silent disease” (Bellou et al., 2018). Diabetes mellitus is classified into four major types based on etiology: type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific types. Effective management of diabetes requires a comprehensive approach to maintain glycemic control, which can be achieved through the four pillars of diabetes care: patient education, nutritional therapy, physical activity, and pharmacological therapy (Migdalis, 2024).

Risk factors for T2DM are broadly categorized into modifiable and non-modifiable determinants. Non-modifiable factors include family history of diabetes, age above 45 years, and ethnicity, whereas modifiable factors encompass obesity, unhealthy diet, physical inactivity, hypertension, and dyslipidemia (Ismail et al., 2021). The pathophysiology of T2DM begins with insulin resistance in peripheral tissues, followed by progressive β -cell dysfunction, leading to impaired insulin secretion. Reduced insulin quantity and affinity hinder glucose uptake into cells, resulting in chronic hyperglycemia and vascular damage (Chen et al., 2024).

In this case report, the patient diagnosed with T2DM was treated with metformin (2×500 mg/day after meals), glimepiride (1×2 mg/day before breakfast), amlodipine (5 mg/day at night), amoxicillin (500 mg three times daily), mefenamic acid (500 mg three times daily), and dexamethasone (0.5 mg three times daily). Pharmacological therapy was combined with patient education regarding adherence and lifestyle modification. Treatment adherence is critical for achieving optimal glycemic control and preventing relapse, as emphasized in clinical guidelines and supported by evidence that compliance significantly reduces the risk of complications (Cooper et al., 2024; Zarora et al., 2022).

Prevention of T2DM relies heavily on lifestyle modification, which remains one of the most effective strategies to delay or prevent disease onset. Individuals are advised to maintain a healthy body weight through balanced nutrition and regular physical activity. International recommendations suggest at least 150 minutes of moderate-intensity exercise per week, such as brisk walking, to improve insulin sensitivity (Oliveira et al., 2024). A balanced diet with limited intake of added sugars and saturated fats is essential, while smoking cessation is strongly recommended, as smoking exacerbates insulin resistance and increases diabetes risk (Pascoe et al., 2017).

Overall, the results of this case highlight the importance of integrating pharmacological therapy with lifestyle and psychosocial interventions. The discussion reinforces that comprehensive management strategies—encompassing medical treatment, patient education, psychosocial support, and preventive lifestyle measures are crucial to achieving sustained glycemic control and reducing long-term complications. Evidence from multidisciplinary care models further supports that integrated interventions improve patient outcomes, enhance adherence, and reduce the burden of diabetes-related morbidity (Meloni et al., 2024; Andersen et al., 2023).

4. Conclusions

This case highlights that type 2 diabetes mellitus is a chronic metabolic disorder with multisystem manifestations that requires comprehensive and sustainable management strategies to achieve optimal outcomes. Elderly patients, particularly those with risk factors such as a family history of diabetes, irregular dietary patterns, physical inactivity, and overweight nutritional status, are at greater risk of developing uncontrolled hyperglycemia, as demonstrated by the patient’s random blood glucose level of 328 mg/dL. Clinical findings in this case, including lower extremity wounds, paresthesia, and decreased functional status, indicate the presence of early complications resulting from poor glycemic control, which if left untreated may progress to severe microvascular and macrovascular damage. The management of diabetes in this patient was approached holistically, combining pharmacological therapy with lifestyle modification, psychosocial intervention, and environmental support. Pharmacological therapy, including metformin and glimepiride, was prescribed to reduce blood glucose levels, while antihypertensive and anti-inflammatory agents were administered to address comorbid conditions and symptomatic complaints. Lifestyle modification was emphasized through dietary regulation, increased physical activity, and avoidance of high-sugar beverages, which are known contributors to insulin resistance and hyperglycemia. Psychosocial interventions, including family support, counseling, and stress management, were integrated to reduce anxiety and improve adherence, recognizing that psychological well-being plays a crucial role in long-term disease control. Environmental factors such as maintaining a clean and supportive home environment were also addressed to reduce infection risk and promote wound healing. This case underscores the importance of a multidisciplinary approach to diabetes management, involving physicians, nurses, nutritionists, psychologists, and social workers, to ensure that patients receive comprehensive care that addresses medical, psychological, social, and environmental dimensions. Sustainable diabetes management requires continuous education, adherence to therapy, regular clinical monitoring, and preventive efforts through behavioral change and environmental optimization. Ultimately, an integrative approach is expected to enhance patients’ quality of life, reduce the risk of complications, and provide long-term benefits by minimizing the burden of microvascular and macrovascular disease, thereby confirming the necessity of holistic and multidisciplinary strategies in the management of type 2 diabetes mellitus.

Author Contributions: Conceptualization, L.R.O. and A.K.; methodology, N.A.J.; software, K.A.M.D.; validation, K.D.R., K.A.A. and L.A.; formal analysis, N.A.J.; investigation, N.A.J.; resources, N.A.J.; data curation, L.A.; writing—original draft preparation, K.D.R.; writing—review and editing, K.A.M.D.; visualization, K.A.A.; supervision, N.A.J.; project administration, A.K.; funding acquisition, L.R.O.

Funding: This study does not receive external funding.

Ethical Clearance: Not applicable. Ethical clearance was not required for this case report as it involved routine clinical management without experimental intervention.

Informed Consent Statement: Written informed consent has been obtained from the patient’s guardian to publish this case report, including clinical details and images.

Data Availability Statement: All data supporting the findings of this study are contained within the article. No additional datasets were generated or analyzed.

Acknowledgments: The authors would like to express their sincere gratitude to the Community Health Center Palace for providing access to clinical facilities and supporting the implementation of this case study. We also extend our appreciation to the medical staff and nurses who contributed valuable assistance during patient care and data collection. Special thanks are given to the patient and her family for their cooperation, trust, and willingness to share their experiences, which made this study possible. We acknowledge the guidance and constructive feedback from colleagues in the Department of Public Health and Clinical Medicine, whose insights greatly improved the quality of this work. The authors are also grateful to academic mentors and peers who provided encouragement and critical review throughout the preparation of this manuscript. Finally, we recognize the support of institutional resources and the collaborative spirit of all contributors involved in this research. Their dedication and commitment to advancing knowledge in diabetes management have been invaluable in completing this study.

Conflicts of Interest: All the authors declare that there are no conflicts of interest.

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