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Original Article

ENHANCING BLOOD SUGAR CONTROL IN TYPE II DIABETES MELLITUS THROUGH NON-PHARMACOLOGICAL FOOT EXERCISE THERAPY: A QUALITATIVE CASE STUDY

Kusuma Wijaya Ridi Putra [1*], Akhmad Khoirul Anam [1], Karisma Dwi Ana [1]

[1] Bachelor of Nursing Science, College of Health Sciences of Husada Jombang

Correspondence:
Kusuma Wijaya Ridi Putra
Bachelor of Nursing Science, College of Health Sciences of Husada Jombang
e-mail: ridiputra@hotmail.com

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ABSTRACT

Background: Type II Diabetes Mellitus (DM) is a chronic metabolic disorder often accompanied by blood glucose instability, increasing the risk of long-term complications. Non-pharmacological interventions such as foot exercise therapy offer a complementary approach to blood sugar control.

Objectives: The study was to evaluate the effectiveness of non-pharmacological foot exercise therapy in enhancing blood sugar control in Type II DM patients.

Design: This qualitative case study involved two patients with Type II DM who experienced unstable blood glucose levels at the Sedap Malam Room, RSI Nashrul Ummah Lamongan. Nursing care included implementing diabetic foot exercise therapy performed once daily for three consecutive days. Blood glucose levels were measured before and after the intervention using a glucometer. Data were analyzed descriptively.

Results: Both patients demonstrated a reduction in blood glucose levels. Patient 1's blood glucose decreased from 244 mg/dl to 181 mg/dl, while Patient 2's dropped from 265 mg/dl to 160 mg/dl. Additional outcomes included reduced fatigue and improved self-management awareness.

Conclusion: Non-pharmacological foot exercise therapy effectively lowered blood glucose levels in Type II DM patients. This therapy can serve as a supportive nursing intervention to enhance glycemic control, minimize complications, and improve patient quality of life.

Keywords: Type II Diabetes Mellitus, Blood Glucose Control, Foot Exercise Therapy, Non-Pharmacological Intervention, Nursing Care.

INTRODUCTION

Type II Diabetes Mellitus (DM) is a major global health concern with increasing prevalence. According to the International Diabetes Federation (IDF), approximately 537

million people worldwide were living with diabetes in 2021, and this number is expected to rise to 783 million by 2045 (International Diabetes Federation, 2021). Indonesia ranks fifth globally, with 19.5 million cases reported in 2021, indicating a significant national burden. The rising number of DM cases has been accompanied by increased complications, primarily due to poor blood glucose control.

Hyperglycemia, a common and serious manifestation of uncontrolled DM, can lead to acute and chronic complications, including neuropathy, retinopathy, nephropathy, and cardiovascular diseases (American Diabetes Association [ADA], 2022). Effective blood glucose regulation is essential to reduce these risks. While pharmacological interventions remain a cornerstone of treatment, non-pharmacological strategies, such as diabetic foot exercises, offer a promising complementary approach (Pratiwi, 2022a).

Diabetic foot exercise is a physical activity aimed at improving blood circulation in the lower extremities, strengthening muscles, and preventing complications such as foot ulcers. This method can also help stabilize blood glucose levels through enhanced insulin sensitivity and muscle glucose uptake (Elyta & Piko, 2022). Despite its potential, structured diabetic foot exercise is not widely implemented or standardized in clinical practice in Indonesia, particularly in local health settings like RSI Nashrul Ummah Lamongan, where an increase in DM-related admissions has been observed. Based on internal hospital data, RSI Nashrul Ummah Lamongan has reported a steady increase in diabetes-related admissions, with an average of 10 new DM cases per month in 2023.

The gap identified in this study is the limited application and documentation of non-pharmacological therapies, such as diabetic foot exercises, as part of routine nursing care for patients with unstable blood glucose levels. This highlights the need for evidence-based implementation and evaluation.

This study is guided by a nursing care framework that integrates physiological monitoring with patient-centered interventions aimed at improving clinical outcomes and self-management capacity.

The aim of this study was to analyze the effect of non-pharmacological diabetic foot exercise therapy on stabilizing blood glucose levels in patients with Type II Diabetes Mellitus.

METHODS

Study Design

This study used a qualitative descriptive approach with a case study design, as described by Yin (2018), emphasizing real-world contextual understanding. The nursing process framework guided the intervention, emphasizing individualized care and evaluation.

Setting

The study was conducted at the Sedap Malam Room, RSI Nashrul Ummah Lamongan, East Java, Indonesia. The intervention took place from October 12 to October 14, 2024.

Research Subject

The research subjects were two adult patients diagnosed with Type II Diabetes Mellitus who presented with unstable blood glucose levels. Participants were selected through purposeful sampling based on specific inclusion criteria: being over 18 years of age, diagnosed with Type II DM, experiencing blood glucose instability (random glucose levels ≥200 mg/dl), being able to understand and perform the foot exercises, and willing to provide informed

consent. Patients with diabetic foot ulcers, musculoskeletal disorders preventing lower limb movement, or cognitive impairments were excluded from the study.

Instrument

Data collection was performed using several instruments. A glucometer was used to measure blood glucose levels before and after each exercise session. An observation checklist was employed to monitor patients' physical responses, and nursing documentation forms were used to record assessments, diagnoses, interventions, and evaluations systematically. Interviews were conducted with each patient to gather subjective data regarding their symptoms, experiences, and feedback related to the intervention. Physical examinations were conducted before the intervention to ensure that participants were physically capable of performing the exercises. Throughout the intervention, patients' vital signs and glucose levels were closely monitored.

Data Collection

After obtaining research permits, researchers conducted research in the Sumobito Health Center area and preliminary studies with several integrated health service post cadres. After obtaining the data, the toddler had a height of ≤-2 elementary school from the health center. The researcher conducted research at the related integrated health service post and door-to-door.

Data Analysis

Data were analyzed descriptively. Changes in blood glucose levels before and after the intervention were compared to assess the effect of the foot exercise. Observations and qualitative notes from the interviews were interpreted to evaluate improvements in patient comfort, symptom relief, and ability to perform the intervention independently.

Ethical Consideration

Ethical clearance was obtained from the ethics committee of the College of Health Science of Husada Jombang. All participants signed informed consent forms after receiving comprehensive information about the study objectives, procedures, risks, and benefits. Participants were assured of their right to withdraw at any time without consequence, and confidentiality of all collected data was strictly maintained.

RESULTS

This case study involved two patients diagnosed with Type II Diabetes Mellitus, both of whom experienced blood glucose instability. The intervention implemented was diabetic foot exercise therapy, which was performed once daily for three consecutive days under nursing supervision. Each exercise session lasted approximately 15–20 minutes and followed structured steps aimed at improving circulation, muscle strength, and glucose metabolism in the lower extremities.

Client 1, a 56-year-old male, had an initial random blood glucose level of 244 mg/dl. Following the foot exercise therapy on day one, his glucose level decreased to 211 mg/dl. On day two, his level further dropped to 192 mg/dl, and on the third day, the glucose reading reached 181 mg/dl. Clinically, the client reported a reduction in fatigue, improved energy during activity, and a better understanding of non-pharmacological self-care.

Client 2, a 63-year-old female, had an initial random blood glucose level of 265 mg/dl. After the first session of foot exercise, her glucose level declined to 215 mg/dl. By the second

day, it had decreased to 178 mg/dl, and on the final day of the intervention, it reached 160 mg/dl. She reported improvements in comfort and expressed increased motivation to continue the exercises independently after discharge.

Table 1. Blood Glucose Level Changes Over Three Days.

Patient	Day 1	Day 2	Day 3
1	244 mg/dl => 211 mg/dl	192 mg/dl	181 mg/dl
2	265 mg/dl => 215 mg/dl	178 mg/dl	160 mg/dl

The target for random blood glucose in non-critical patients is generally < 180 mg/dl (American Diabetes Association [ADA], 2023).

Both clients were evaluated using the nursing process, including comprehensive assessment, diagnosis, planning, intervention, and evaluation. The primary nursing diagnosis for each case was "blood glucose level instability related to insulin resistance," supported by subjective complaints such as fatigue, increased thirst, and frequent urination, and objective data including elevated blood glucose readings.

The intervention outcomes revealed a clear reduction in blood glucose levels over the three-day intervention period. In addition, qualitative observations indicated positive changes in the client's knowledge, attitudes, and behaviors regarding diabetes self-management. Both clients expressed satisfaction with the intervention and demonstrated the ability to perform the exercises independently.

These results suggest that diabetic foot exercise therapy, as part of comprehensive nursing care, contributes to the stabilization of blood glucose levels and enhances patient engagement in non-pharmacological self-care practices. The nursing intervention also proved feasible for implementation in hospital settings without the need for specialized equipment.

DISCUSSION

This case study aimed to evaluate the effectiveness of diabetic foot exercise as a non-pharmacological intervention in stabilizing blood glucose levels in patients with type II diabetes mellitus. The results showed a significant reduction in blood glucose levels in both clients after performing the diabetic foot exercise for three consecutive days. Client 1's glucose levels decreased from 244 mg/dL to 181 mg/dL, and Client 2's decreased from 265 mg/dL to 160 mg/dL. These findings suggest that diabetic foot exercise has a beneficial effect on glycemic control in diabetic patients experiencing blood glucose level instability.

The intervention reduced blood glucose significantly over three days. These results support earlier findings that physical exercise improves insulin sensitivity and glucose uptake (Colberg et al., 2021). Foot exercise, in particular, stimulates blood flow in the lower extremities, which may contribute to enhanced glucose metabolism and tissue perfusion (Pratiwi, 2022b; Putri, 2023).

The implementation of diabetic foot exercises also corresponds with evidence provided by Elyta & Piko (2022), who documented a decrease in blood glucose levels in patients after

engaging in 10–20 minutes of daily foot exercise. Similarly, a study by Prihantoro (2022) reported that after three sessions, diabetic patients experienced measurable reductions in glucose levels, especially on the third day of intervention.

From a nursing perspective, the implementation of this intervention supports the nursing diagnosis of *blood glucose level instability* (D.0027) as outlined in the Indonesian Standard for Nursing Diagnosis (SDKI). The outcome criteria—*glucose level stability* (L.03022)—were met in both cases, supported by the nursing intervention *hyperglycemia management* (I.03115), which includes monitoring glucose levels, educating patients, and recommending non-pharmacological approaches such as physical exercise.

In clinical practice, nurses are in a strategic position to integrate diabetic foot exercises into holistic care plans. This case study demonstrates how patient education and simple, structured activities can empower patients to take an active role in managing their diabetes, thereby reducing the risk of complications such as diabetic foot ulcers, peripheral neuropathy, and cardiovascular disease (American Diabetes Association [ADA], 2023; World Health Organization, 2022).

Despite the positive outcomes, the study highlighted certain challenges, such as variability in patient compliance and motivation. Sustained behavioral change often requires continuous support and education. Therefore, nurses must regularly assess patient engagement, provide reinforcement, and adjust care plans to meet individual needs (Black & Hawks, 2019).

In addition, the short duration of the intervention (three days) limits generalizability. Nevertheless, the rapid response in glucose reduction suggests the potential for immediate benefits, especially when combined with pharmacological treatment. This supports a biopsychosocial approach to chronic disease management that values patient-centered care and interdisciplinary collaboration.

Overall, the findings of this case study contribute to the growing body of knowledge emphasizing the importance of non-pharmacological interventions in diabetes care. Diabetic foot exercise can be considered an effective adjunctive therapy, particularly in hospital settings where nurses can introduce and supervise the technique before discharge.

CONCLUSION

This case study concludes that diabetic foot exercise is an effective non-pharmacological intervention to help stabilize blood glucose levels in patients with type II diabetes mellitus. After undergoing a three-day exercise intervention, both clients in this study experienced significant reductions in their blood glucose readings. These results support the clinical use of diabetic foot exercises alongside pharmacological treatment as a practical, low-cost strategy in nursing care for diabetic patients. The findings also affirm the relevance of the conceptual framework linking physical exercise to improved metabolic function and demonstrate that the nursing diagnosis of “blood glucose level instability” and associated outcome indicators are appropriate for guiding interventions in similar cases. Overall, the study contributes new knowledge to the nursing field regarding the use of structured physical activity in managing chronic illnesses such as diabetes. Nurses should incorporate this intervention as part of routine care. Future research should use larger samples and experimental designs to confirm findings.

SUGGESTION

Based on the outcomes of this case, several suggestions can be proposed. First, in clinical practice, nurses are encouraged to routinely educate patients with type II diabetes about the benefits of diabetic foot exercises and assist them in incorporating these exercises into their daily routines. Health professionals should ensure that patients receive hands-on guidance, especially before hospital discharge. Second, nursing education curricula should include non-pharmacological therapies like diabetic foot exercises as part of clinical training to enhance student competence in holistic care approaches. Third, future research should aim to include larger samples and longer intervention periods to validate the effectiveness of diabetic foot exercise and examine its long-term impact on glycemic control and complications. Lastly, healthcare institutions should develop standard operating procedures (SOPs) for diabetic foot exercises to ensure consistency and promote adherence among diabetic patients in both hospital and community settings.

LIMITATION

This study, while insightful, is not without limitations. The most significant limitation is the small sample size, as only two patients were included, which limits the generalizability of the findings to a broader population. Additionally, the intervention was conducted over a short period of three days, which may not fully capture the long-term effects of diabetic foot exercises on glycemic control. The absence of a control or comparison group also restricts the ability to isolate the intervention's specific effects from other variables. Furthermore, as a single-case study, the trustworthiness and transferability of the results are limited and may not apply to all settings without modification. Nevertheless, the findings offer valuable practical insights and can serve as a foundation for future research on nursing interventions in diabetes care.

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