



Diabetic Foot Exercise to Reduce High Blood Sugar Levels in Diabetes Mellitus Patient: A Case Study

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ABSTRACT

Diabetes mellitus is a metabolic disorder in the pancreas organ so that sugar levels increase due to a decrease in the amount of insulin in the pancreas. Therapeutic management pharmacology, namely administering insulin and administering oral hypoglycemic drugs, while non-pharmacological includes health education, diet, and exercise or physical training such as diabetes foot exercises. This research uses a case study method using pre and post methods carried out before and after the intervention. The data collection location was in the Lavender room at dr. Soebandi Hospital starts on 30 October 2023. Based on these results, it shows a change in blood sugar levels before and after administering diabetic foot exercise therapy is carried out for three consecutive days once a day, carried out in the morning 1-2 hours after breakfast. Diabetic foot exercises that are done regularly are expected to prevent complications often occurs in patients such as infected wounds on the feet. The results of the nursing evaluation are related to the diagnosis of instability in blood glucose levels which indicates changes in the patient's blood sugar levels where the patient's blood sugar values decreased after the intervention.

Keywords: Type 2 Diabetes Mellitus, Foot Exercises, Blood Sugar Levels

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I. INTRODUCTION

Diabetes mellitus is a metabolic disorder in the pancreas organ that results in increased sugar levels caused by a decrease in the amount of insulin in the pancreas (Yulianti & Armiyati, 2023). According to the World Health

Organization (WHO, 2013) Diabetes Mellitus is a chronic disease where the pancreas organ cannot produce sufficient amounts of insulin or when the body is not effective in using it (Lidia M Dihongo & Sonhaji, 2024). This disease is chronic and is characterized by hyperglycemia, which

is a condition in which blood sugar levels increase above normal which is a characteristic of several diseases, especially diabetes mellitus (Hasanah & Hisni, 2023).

According to data from the International Diabetes Federation (IDF) in 2017, the prevalence of diabetes mellitus in the world reached 424.9 million people and is expected to reach 628.6 million in 2045. According to Riskesdas (2018), it shows that the prevalence of diabetes mellitus in Indonesia based on a doctor's diagnosis at age \geq 15 years as much as 2%. The prevalence of diabetes mellitus in East Java is 863,686 people aged 15 years and over, where in 2022 in Jember Regency there will be 38,018 diabetes mellitus sufferers detected from a total of 50 Community Health Centers in Jember (Dinkes Jawa Timur, 2023).

Diabetes mellitus can be caused by several factors including gender, age, education level, family income, family history of diabetes mellitus, family history of hypertension, unhealthy behavior such as smoking, drinking alcoholic beverages, lack of physical activity, and consuming food. excessive oiliness. Signs and symptoms of diabetes mellitus sufferers are characterized by frequent urination due to high blood glucose levels which will cause frequent urination, drinking a lot, eating a lot due to a negative calorie balance

resulting in feelings of hunger, weight loss and a feeling of weakness, sometimes tingling in the feet at night, disturbing sleep, visual disturbances, itching and ulcers (Indriyani et al., 2023).

Grouping therapy for diabetes mellitus sufferers can be done with pharmacological therapy and non-pharmacological therapy. Management of pharmacological therapy includes administering insulin and administering oral hypoglycemic drugs, while non-pharmacological therapy includes health education, exercise training and diet (Ritonga et al., 2023, Rochman, 2024). Physical exercise aims to increase insulin sensitivity, prevent obesity, improve blood flow, stimulate the formation of new glycogen, and prevent further complications.

Diabetic foot exercises are a form of physical exercise carried out by diabetes mellitus sufferers of all ages to avoid injury so that blood circulation in the feet remains smooth. This leg exercise aims to improve blood circulation so that nutrients reach the tissues more smoothly, strengthen small muscles, calf muscles and thigh muscles, and overcome the limited joint movement often experienced by diabetes mellitus sufferers (Syaipuddin et al., 2023). Based on this presentation, the researcher intends to apply nursing care using

diabetic foot exercises to patients with type 2 diabetes mellitus to reduce high sugar levels in the Lavender Room at dr. Soebandi Jember Hospital.

2. METHODS

This type of research is a case study using nursing. In this study, pre and post methods were used before and after the intervention was carried out to see the effect by looking at the differences in blood glucose level examination results. The samples in this study were diabetes mellitus patients in the Lavender room at dr. Soebandi Hospital. The data source for this research consists of primary data collected using interview techniques including patient identity in the form of name, age, occupation, education, religion, address, as well as status, medical history and history of previous illnesses. Meanwhile, secondary data is obtained from patient medical records which include the results of laboratory examinations and therapy given to patients. The sample inclusion criteria used were hyperglycemia, treated in the Lavender room at dr. Soebandi Hospital, and is willing to be a respondent. Patients were given a 10-15 minutes diabetic foot exercise intervention from October 30 to November 1 2023. Before the intervention was carried out, the patient had their blood

sugar checked first and an evaluation was carried out after the diabetic foot exercise intervention was carried out. out by checking his blood sugar levels again. The materials and instruments used in this research were standard operating procedures (SOP) for diabetes foot exercise therapy prepared by the nursing faculty at Jember University, a medical nursing assessment format, and a glucometer.

3. RESULTS

The patient managed in this final scientific work is Mr. S 59 years old man from the Javanese tribe. Type 2 diabetes mellitus patient treated in the Lavender room at dr. Soebandi Hospital on the second day, the reason for going home was shortness of breath since 2 weeks ago and it got worse since today, there was heartburn and nausea accompanied by swollen feet and coughing. In the initial assessment carried out by researchers, the patient said he was short of breath, weak, felt tired, still nauseous, urinated frequently. The patient was given simple mask oxygen therapy at a rate of 10 L/minute. In the patient's case, the researcher stated 3 nursing diagnoses that were given treatment, one of which was given special treatment and measurements for research purposes, namely instability of blood glucose levels related to insulin

resistance, d.d. fatigue, lethargy, dry mouth, high blood glucose levels = 216 mg/dL (D. 0027).

Diagnoses raised by researchers have been given treatment in accordance with the interventions in the Indonesian Nursing Intervention Standards (SIKI). There is one specific diagnosis that is being studied further by researchers, namely related to instability of blood glucose levels. This diagnosis was made because it was related to the patient's condition at the time of the assessment, namely weakness, fatigue, frequent urination, and fasting blood sugar test results of 216 mg/dL. Apart from that, from the laboratory results the

day before, the GDS examination result was 304 mg/dL so the researchers were interested in providing interventions that were in accordance with Evidence Based Nursing which the researchers studied regarding providing diabetes foot exercise interventions to patients. helps lower blood glucose levels. Diabetic foot exercises are carried out 1-2 hours after the patient has breakfast for 10-15 minutes. This diabetic foot exercise is done once a day in the morning. Before and after implementation, the patient's blood glucose level was measured using a glucometer with the results as in table 1.

Table 1. Monitoring of Implementation

| Day | Blood glucose levels | |
|-------|----------------------|-----------|
| | Pre | Post |
| Day 1 | 216 mg/dL | 213 mg/dL |
| Day 2 | 187 mg/dL | 179 mg/dL |
| Day 3 | 175 mg/dL | 173 mg/dL |

4. DISCUSSION

The results of applying diabetic foot exercises in this panel show a decrease in blood sugar levels in diabetes mellitus patients in the Lavender room at Dr. Soebandi Hospital before and after foot exercise therapy. This is in accordance with research that has been conducted showing that there is an influence of diabetic foot exercises on changes in blood sugar levels in people with type 2 diabetes

mellitus with a significant value of $p = 0.000$ (Ritonga et al., 2023). Based on theory, diabetes foot exercises aim to improve blood circulation in the feet, so that nutrients flow smoothly to the tissues, strengthen the small muscles of the feet and prevent foot deformities, overcome the limited amount of insulin due to blood in actively moving muscles can increase contractions so that cell membrane permeability to glucose increases, insulin

resistance decreases and insulin sensitivity increases so that blood circulation increases and blood sugar levels decrease in diabetes mellitus sufferers (Afrianti, 2022). Diabetes mellitus sufferers who use leg exercises will experience leg movements which cause the leg muscles to become tense and put pressure on the veins around the muscles which can push blood towards the heart and reduce venous pressure which is called a venous pump, where this mechanism will occur happen. Helps improve blood circulation in the lower body. feet and improve blood circulation.

The application of diabetic foot exercises is carried out for three consecutive days, once a day. This diabetic foot exercise therapy is carried out in the morning, which is 1-2 hours after the patient has breakfast. This is done because at that time, the injected insulin is already working and the food consumed by the patient has begun to be digested so that the risk of hypoglycemia is lower. In addition, about 1-2 hours after eating and injecting insulin, insulin is indeed working but has not reached its peak, where at the peak insulin reaches its highest concentration in the blood and its effect is strongest in lowering blood sugar levels.

In the application of diabetes foot exercise therapy to patients, there are differences in the duration of foot exercise

therapy between the journals referred to and those carried out by researchers. Based on several studies and journal analyzes that have been carried out, the duration of diabetic foot exercise is around 30 minutes. This is different from the duration of the diabetic foot exercises carried out by researchers, which is around 10-15 minutes. This happened because the patient Mr. S experienced edema in both lower extremities during diabetes foot exercise therapy. A shorter duration of around 10-15 minutes can reduce the risk of fatigue and excessive discomfort in the patient and minimize the risk of worsening edema (Firdausa et al., 2023). Based on this, people with foot edema can continue to do diabetes foot exercises safely and effectively so that they can help improve circulation without worsening the edema condition.

According to research results, efforts to treat diabetes mellitus patients and prevent complications include doing regular physical activity or exercise. The physical activity that is recommended to be carried out regularly by DM sufferers is diabetic foot exercises. Diabetic foot exercises that are done regularly are expected to prevent complications that often occur in DM sufferers, such as infected wounds on the feet. This diabetic foot exercise can be done indoors or

outdoors for 10-15 minutes (Hasanah & Hisni, 2023). Based on the results of implementing diabetic foot exercises in type 2 DM patients, namely Mr. S in the Lavender room at RSD dr. Soebandi Jember showed changes in blood sugar levels, namely from 216 mg/dL to 173 mg/dL.

5. CONCLUSIONS

Based on the results of the implementation and analysis of diabetic foot exercises in patients with nursing problems, blood glucose levels were unstable in the Lavender room at dr. Soebandi Hospital concluded that the results of the nursing evaluation regarding the diagnosis of unstable blood glucose levels showed a change in the patient's blood sugar level from the original 216 mg/dL to 173 mg/dL during the diabetic foot exercise intervention for three consecutive days.

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AUTHOR CONTRIBUTIONS

Substantial contribution to conception, data collection, and analysis: Faise Lailatul Musarrofa. Writing

Manuscript and revision: Faise Lailatul Musarrofa, Rondhianto, Muhammad Zulfatul A'la, Sujarwanto.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data are not publicly available due to privacy or ethical restrictions.

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