

Section: General Nursing

Progressive muscle relaxation for blood glucose management in patient with type 2 diabetes

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Abstract

Diabetes Mellitus (DM) is a metabolic disorder characterized by persistent hyperglycaemia, or elevated blood glucose levels. Epidemiological data reflects a significant rise in local prevalence, growing from 6,483 recorded DM cases in 2019 to 18,583 patients in Magelang district in 2023. If left unmanaged—particularly in elderly populations—chronic hyperglycaemia leads to severe systemic complications, including cardiovascular disease, renal failure, diabetic retinopathy, and stroke. Standard pharmacological management commonly relies on first-line agents such as metformin, thiazolidinediones, and sulfonylureas. Metformin remains the primary oral agent of choice due to its proven cardiovascular benefits, minimal risk of hypoglycaemia, potential anti-aging pathways, and high cost-effectiveness. Despite these therapeutic advantages, metformin exhibits notable adverse side effects, including chest discomfort, tachycardia, headaches, fatigue, and gastrointestinal disturbances such as nausea, vomiting, diarrhoea, abdominal pain, constipation, and flatulence. To complement medical regimens and mitigate disease burden, non-pharmacological supportive interventions are frequently integrated into nursing care. Among these, progressive muscle relaxation (PMR) therapy serves as an effective complementary technique to help stabilize blood glucose concentrations in patients with diabetes. In clinical practice, PMR involves structured muscle tension-and-release protocols performed for 15 to 25 minutes twice daily over a three-day period. Case study findings demonstrate that implementing PMR therapy led to a significant reduction in random blood glucose levels, decreasing from a baseline of 235 mg/dL down to 190 mg/dL. Consequently, progressive muscle relaxation therapy represents a viable nursing intervention that positively influences glycaemic control by lowering blood glucose levels.

Keywords: Diabetes care, diabetes management, patient care, prevention, progressive muscle relaxation

Introduction

Diabetes Mellitus (DM) is a non-communicable disease that can be suffered by people worldwide, with Indonesia ranking sixth in the number of DM sufferers, following China, India, the United States, Brazil, and Mexico (Hossain et al., 2024). The International Diabetes Federation stated that there are 463 million people with DM aged 20-79 years (Genitsaridi et al., 2026). The increase in the number of DM is predicted to reach 578 million by 2030 and 700 million by 2045 (Pan et al., 2025). Meanwhile, it is estimated that by 2045, Indonesia will shift from eighth place to being ranked with 16.6 million people suffering from. In 2019, Central Java province had 662,882 DM sufferers. Based on the 2018 data, it is stated that in Magelang District there were 3,380 diabetes patients, in 2019 there were 6,483 diabetes patients, and in 2023 there were 18,583 diabetes patients. Similarly, at Aisyiyah Hospital in Muntilan, the number of diabetes patients continues to increase, with inpatient admissions from January to December 2024 reaching 2,780 people. The causes of Type II diabetes include smoking habits, physical activity, alcohol consumption, stress factors, and excessive coffee and caffeine consumption. In addition, factors of an unhealthy lifestyle that trigger type II diabetes include excessive energy intake, habits of consuming foods with high energy density (high in fat and glucose, low in fiber), irregular meal schedules, skipping breakfast, snacking habits, incorrect food processing techniques (heavy use of oil, glucose, and thick coconut milk), and a lack of physical activity caused by technological advancements and the availability of various facilities that provide conveniences for most of the population (Zhang et al., 2025). This disease continues to develop along with an increased risk of diabetes such as a sedentary lifestyle, unhealthy eating patterns, obesity, alcohol consumption, genetics, and smoking (Pathak et al., 2025).

Complications that occur if elderly patients with DM are not treated promptly can lead to heart disease, kidney failure, retinopathy, and stroke. Macrovascular and microvascular complications can disrupt the physiology of the patients and lead to a decreased quality of life. There are pharmacological treatments for DM, including the use of oral medications. The recommended medications for DM patients are metformin, thiazolidinediones, and sulfonylureas. Metformin is widely chosen as a diabetes treatment due to its positive effects on cardiovascular diseases, low risk of hypoglycemia, anti-aging effects, and affordability. However, metformin also has side effects, including chest

discomfort, a rapid heartbeat, headaches, weakness, and gastrointestinal issues such as nausea, vomiting, diarrhea, stomach pain, constipation, and bloating.

In addition to pharmacological therapy, there is also complementary treatment with complementary therapy that can stabilize blood glucose levels in patients with diabetes mellitus. Progressive muscle relaxation therapy is a type of exercise that focuses on the tightening and relaxing of muscles, which is useful for lowering glucose levels in the blood of DM patients (Rochmah et al., 2023). This can occur due to the suppression process during the release of hormones that can trigger an increase in blood glucose levels, namely epinephrine, cortisol, glucagon, adrenocorticotrophic hormone (ACTH), corticosteroids, and thyroid hormones. The administration of progressive muscle relaxation therapy is conducted for 15-25 minutes twice a day for three days. Progressive muscle relaxation has a significant effect on lowering blood glucose levels with interventions conducted twice in the morning and evening for three days. The study is also in line with Ferry's research in 2023 which states that progressive muscle relaxation can have psychological effects. After performing progressive muscle relaxation, clients become calmer in their thinking and can manage their stress and breathing.

Case Description

The observation guidelines assist researchers in accurately observing and are carried out using patient data formats, nursing care formats, the assessment format of the 13 NANDA domains, Standard Operating Procedures for progressive muscle relaxation therapy, a Glucometer, and blood glucose levels at the time as benchmarks for screening and diagnosing diabetes mellitus: random blood glucose (normal <200 mg/dl), (abnormal >200 mg/dl) fasting blood glucose (normal <126 mg/dl) (abnormal >126). The interview guidelines are conducted through question-and-answer sessions with Diabetes Mellitus patients. General complaints from patients indicate feeling easily fatigued/often tired, Mr. M frequently feels thirsty, urinating 6-9 times a day with a volume of about 1400cc, his feet often experience numbness, and the soles of his feet sometimes hurt accompanied by itching. Mr. M reports nausea or the feeling of wanting to vomit and appears to be sweating cold. The patient states that he has had diabetes mellitus for 3 years. The skin colour on the patient's legs appears pale, Blood Pressure: 130/87mmHg, Temperature: 36.5 C, SPO2: 99%, RR: 20x/min, HB: 13.2, CRT: > 2 seconds, N: 110x/min, no oedema and no wounds. The patient reports occasional dizziness. GDS: 377 mg/dl. Current treatment is NaCl infusion 20 drip per minute, omeprazole 1 vial/24 hours, ondansetron 1 ampule/8 hours, Metformin 2x1, Gliclazide 1x1. Weight is 60 kg, height is 168 cm, and body mass index is 22 kg/m², which is categorized as normal. The results of the data analysis can formulate 3 nursing diagnoses. The diagnoses to be discussed in this scientific work according to priority are as follows: Glucose Level Instability related to Insulin Resistance evidenced by high blood glucose levels (D.0027), Ineffective Peripheral Perfusion related to hyperglycaemias evidenced by paraesthesia (D.0009), Nausea related to pancreatic disorders evidenced by nausea and vomiting (D.0076). The implementation to be carried out includes monitoring blood glucose levels, monitoring fluid intake and output, recommending adherence to diet and exercise, teaching Complementary Therapy (Progressive Muscle Relaxation).

Discussion

The author plans a target of 3x7 hours with complementary therapy interventions of progressive muscle relaxation therapy to stabilize blood glucose conducted over 3 days with 2 treatment interventions in the morning and evening. In line with (Karokara, 2019), the implementation of progressive muscle relaxation techniques is very effective in lowering blood glucose levels. This is evidenced by the blood glucose level on the first day before the administration of progressive muscle relaxation therapy, which was 367 mg/dl, and on the third day after the administration of progressive muscle relaxation therapy, the blood glucose level was 190 mg/dl. Researchers reveal that respondents should perform progressive muscle relaxation exercises for 15-25 minutes, twice a day in the morning and evening for three consecutive days. This is in accordance with study, who states that to achieve maximum results, it is recommended to practice PMR at the same time twice a day for 15-25 minutes in the morning and evening, and results will be evident after three training sessions. The implementation is carried out over three visits with two interventions in the morning (09:00 AM) and afternoon (14:00 PM) for the patient. In line with the research which indicates that progressive muscle relaxation therapy can be performed for 25 minutes twice a day.

In managing blood glucose levels, there are two approaches used, namely progressive muscle relaxation therapy and the use of metformin medication. Both can complement each other to achieve a more optimal outcome in managing blood glucose levels. The author conducted an evaluation from September 26-28, 2024. From the first day of evaluation, there was a decrease in blood glucose from 377 to 330 mg/dl, a drop of 47 mg/dl. Therefore, this therapy can become one of the effective strategies in managing blood glucose levels and improving quality of life to reduce the risk of DM complications. The advantages of this relaxation therapy are that it has no side effects, can be done independently, lowers blood glucose levels, does not require additional costs, can be done anytime and anywhere, and helps reduce stress and anxiety. On the other hand, the obstacles of progressive muscle relaxation therapy are as follows: first, patients may find it difficult to maintain relaxation, especially if they have busy thoughts or stress. Second, patients may not have enough knowledge about progressive muscle relaxation techniques, making it difficult for them to do it correctly. Third, patients may be influenced by their surroundings (noise) which can affect their ability

to relax. And fourth, patients may have unhealthy lifestyle habits, such as unbalanced diets or lack of exercise, which can affect the effectiveness of relaxation therapy (Sami et al., 2017; Wu et al., 2022; Yun et al., 2022).

Conclusion

Nursing care plans in accordance with nursing care. Monitor blood glucose levels, monitor fluid intake and output, teach non-pharmacological techniques for progressive muscle relaxation to stabilize blood glucose levels, teach oral diabetes management and recommend adherence to diet and exercise. Perform progressive muscle relaxation therapy to stabilize blood glucose levels with 14 movements done twice a day, in the morning and evening, for 3 days, with a duration of 15-25 minutes. After performing progressive muscle relaxation therapy, there was a decrease in blood glucose levels. The evaluation on the first day showed a decrease of 47 mg/dl, on the second day a decrease of 51 mg/dl, and on the third day a decrease of 45 mg/dl. The implementation of this treatment, carried out twice a day for three consecutive days, will have a positive impact on lowering blood glucose levels if done regularly. This scientific work is expected to provide information for the development of knowledge in the field of nursing, especially in the nursing care of Diabetes Mellitus (DM) patients. The author hopes that subsequent researchers can conduct better practices related to the application of progressive muscle relaxation therapy or other complementary therapies to stabilize blood glucose.

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