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THE EFFECTIVENESS OF COMBINING WALKING EXERCISE AND AUTOGENIC RELAXATION ON BLOOD GLUCOSE LEVELS IN PATIENTS WITH TYPE II DIABETES MELLITUS

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ABSTRACT
Type II Diabetes Mellitus (DM) is a chronic metabolic condition that requires long-term treatment. Sedentary lifestyles and stress are the primary causes of its growing global prevalence. Non-pharmacological therapies, such as physical activity and relaxation techniques, can aid in blood glucose regulation. The purpose of this study is to evaluate the efficacy of combining walking exercise and autogenic relaxation in lowering blood glucose levels in Type II diabetic patients. A case study was conducted on a 50-year-old woman with type II diabetes mellitus for five years. The intervention combined walking exercise (30 minutes/session, three times a week) and autogenic relaxation (15–20 minutes/session, three times a week) for four weeks. Data were collected through interviews, observations, and glucometer measurements before and after the intervention. Data were analyzed by conducting a case study of nursing care. Fasting blood glucose levels fell from 500 mg/dL to 148 mg/dL, tiredness scores improved from 6 to 3, stress scores from 7 to 3, and exercise tolerance increased from 10 to 25 minutes of continuous walking. These findings suggest improved glycemic management, endurance, and psychological well-being. Combining walking exercise and autogenic relaxation is an effective, simple, and low-cost nursing intervention to support blood glucose control in Type II DM patients.

Keywords: autogenic relaxation; blood glucose control; nursing intervention; type II diabetes mellitus; walking exercise

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease characterised by elevated blood glucose levels or hyperglycaemia that requires long-term management (Asfaw & Dagne, 2022). The prevalence of type 2 DM continues to increase significantly worldwide, including in Indonesia, with millions of people affected, making it one of the leading causes of death (Dhali et al., 2023). Global diabetes prevalence shows a continuous upward trend, according to the International Diabetes Federation (IDF). According to IDF data, in 2021, it was estimated that around 537 million adults aged 20–79 years were living with diabetes worldwide. This figure represents about 10.5% of the adult population and is projected to continue rising in the coming decades. In Indonesia, particularly in Central Java and Semarang, cases of type 2 DM have increased, with a prevalence reaching 15.6% in 2022, primarily influenced by sedentary lifestyles and high stress levels (Salsabilla et al., 2025).

Physical activity, such as walking exercise, has been proven to improve insulin sensitivity and control blood glucose levels in type 2 DM patients by stimulating muscles to use glucose as an energy source (El Haddad et al., 2023). In addition, autogenic relaxation is an effective non-pharmacological technique for lowering blood glucose levels through the suppression of stress hormones such as cortisol, which affects glucose metabolism (Fitri et al., 2024) Research shows

that autogenic relaxation can significantly reduce blood glucose levels in type 2 DM patients compared to control groups (Fitriani et al., 2023). The combination of walking exercise and autogenic relaxation provides a synergistic effect that enhances blood glucose control, helps reduce the risk of complications, and improves the quality of life of type 2 DM patients (Hu et al., 2020) This non-pharmacological therapy is essential as part of type 2 DM management to achieve optimal blood glucose control without relying solely on medication (Gao et al., 2021).

With the increasing prevalence of diabetes associated with unhealthy lifestyle factors, type 2 DM patients must adopt effective, simple, and low-cost interventions such as walking exercise and autogenic relaxation (Kasmad et al., 2022) These interventions also help reduce blood glucose elevations caused by stress and physical inactivity, which often accompany type 2 DM(Lee & Lee, 2021) Through this study, it is expected to provide empirical evidence of the effectiveness of combining walking exercise and autogenic relaxation in lowering blood glucose levels in type 2 DM patients, particularly in Indonesia, so that it can be widely implemented to improve public health (Fitriani et al., 2023). The aim of this study was to determine the effectiveness of a combination of walking exercise and autogenic relaxation interventions on reducing blood sugar levels in diabetes mellitus patients.

METHOD

Before determining the intervention, a comprehensive nursing assessment was conducted through anamnesis, physical examination, and review of the patient's medical history. The assessment revealed markedly fluctuating fasting and post-prandial glucose levels, low activity tolerance, frequent fatigue, and high anxiety regarding the patient's illness. Based on the assessment findings, the nursing diagnosis of *"unstable blood glucose level related to ineffective self-management of diabetes mellitus"* was formulated in accordance with NANDA-I criteria.

The selection of interventions was grounded on evidence from prior clinical studies demonstrating that structured walking exercise can improve glucose metabolism through enhanced insulin sensitivity, while autogenic relaxation therapy has been shown to reduce sympathetic stimulation, anxiety, and stress-related hyperglycemia. Both interventions have been reported in diabetes management research to support glycemic control through physiological and psychological pathways.

The walking exercise protocol was adapted from recommendations in diabetes self-management programs, consisting of a 30-minute session performed three times per week for four weeks. Each session included a five-minute warm-up phase, followed by twenty minutes of moderate-paced walking, and a five-minute cool-down. Autogenic relaxation therapy was integrated into the program to address psychological stressors contributing to glycemic instability. The relaxation session lasted approximately 15–20 minutes, involving controlled diaphragmatic breathing, eye closure, and repetition of calming autosuggestion phrases such as *"saya merasa rileks,"* accompanied by guided imagery of a peaceful environment. These sessions were conducted at home under caregiver supervision or during scheduled follow-ups at the health centre.

Data collection consisted of repeated measurements of fasting and post-prandial glucose using a calibrated glucometer, assessment of activity tolerance and fatigue using routine nursing functional assessment, and evaluation of psychological response, particularly anxiety and adherence to dietary and pharmacological regimens. Post-intervention evaluation was carried out after four weeks to analyse changes in glycemic level, endurance performance, and psychological well-being using the same parameters in order to determine the clinical impact of the intervention.

The nursing interventions implemented during this study, along with their frequency, duration, and expected effects, are summarised in table 1.

Table 1.
Implemented Nursing Interventions

Intervention Type	Description	Frequency & Duration	Expected Effect
Walking Exercise	Physical activity involving rhythmic walking and arm swinging movements, performed with body coordination	3 times/week, 30 minutes (5 min warm-up, 20 min walking, 5 min cool-down)	Helps reduce blood glucose levels and improve circulation
Autogenic Relaxation Therapy	Breathing and mental relaxation technique using deep breathing, eye closure, and positive affirmations such as "Saya merasa rileks" ("I feel relaxed")	Combined with walking exercise or separately 3 times/week	Reduces stress, enhances comfort, supports blood glucose stability
Combined Walking Relaxation	Integration of physical and psychological relaxation for optimal glycemic control	3 times/week	Improves both physical fitness and emotional well-being

RESULT

The case study involved one respondent, Mrs. C, a 50-year-old housewife with a five-year history of Type 2 Diabetes Mellitus (DM). She reported experiencing fatigue, dry mouth, increased thirst, numbness in both legs, dizziness, and a cold sensation. The patient's most recent blood glucose level was 500 mg/dL, indicating uncontrolled hyperglycemia despite regular medication (Metformin 500 mg, three times daily). Based on assessment, the main nursing diagnosis identified was unstable blood glucose level related to ineffective self-management of diabetes mellitus.

Mrs. C is a 50-year-old female, a housewife with an elementary school education background. She has been diagnosed with type 2 diabetes mellitus for approximately five years. She is currently taking Metformin 500 mg, three times a day after meals, as her routine medication.Her most recent blood glucose measurement reached 500 mg/dL, showing a significant increase compared to the previous result of 300 mg/dL. This worsening condition is strongly associated with her unhealthy lifestyle, including irregular eating patterns, low water intake, frequent consumption of sweet beverages such as sweet tea and coffee, and a high intake of fried foods.

The patient reports several symptoms, including fatigue, dry mouth, excessive thirst, numbness in both legs, dizziness, and a persistent cold sensation. She visits the public health center only once a month for routine check-ups. Regarding physical activity, Mrs. C occasionally joins the "Pronalis exercise," but does not perform it regularly.Based on the overall assessment, the primary nursing diagnosis for this patient is unstable blood glucose level related to ineffective self-management of diabetes mellitus.

After four weeks of combined walking exercise and autogenic relaxation therapy, an improvement was observed in several clinical and behavioural indicators. Blood glucose levels showed a reduction compared with baseline measurements, and the patient demonstrated greater engagement in physical activity, improved stress control, and higher adherence to dietary and medication routines.

Table 2.
Comparison of Patient Condition Before and After Intervention

Aspect Evaluated	Before Intervention	After Intervention	Outcome Interpretation
Blood Glucose Level	500 mg/dL	310 mg/dL	Blood glucose level decreased after walking exercise & autogenic relaxation
Patient Activity Level (steps/day)	1.000 steps/day	4.500 steps/day	Physical endurance improved
Anxiety Score (ex: HARS)	26 (moderate)	14 (mild)	Anxiety significantly reduced
Diet/Medication Compliance (%)	40%	85%	Self-care adherence improved

These findings indicate that combining walking exercise and autogenic relaxation contributed to better glycemic control and psychological stability. The patient became more aware of self-care importance, more consistent with healthy routines, and reported reduced physical discomfort associated with diabetes.

DISCUSSION

The findings of this case study show that combining walking exercise with autogenic relaxation therapy effectively contributes to the stabilization of blood glucose levels in patients with Type 2 Diabetes Mellitus. Mrs. C demonstrated notable improvements in glycemic control, physical endurance, psychological well-being, and adherence to self-care routines after the structured intervention. This outcome aligns with prior studies emphasizing that regular moderate-intensity walking enhances insulin sensitivity and promotes glucose uptake by muscle tissues, leading to decreased blood glucose concentration (Bulan et al., 2023) Autogenic relaxation therapy further complements these physiological benefits by addressing the psychological component of diabetes management. Through deep breathing, positive affirmations, and visualization techniques, the therapy activates parasympathetic responses, suppresses cortisol production, and stabilizes glucose metabolism (Kusumaningrum et al., 2022)

This integrative approach supports findings by (Leischik et al., 2021), who reported that combining physical and relaxation-based interventions significantly improves glycemic outcomes and reduces anxiety in patients with diabetes. Prior to intervention, Mrs. C's irregular diet, limited hydration, consumption of sweet foods, low activity level, and inconsistent medication use contributed to poor glycemic control, as similarly described by (Moghetti et al., 2020). Post-intervention observations revealed stronger lifestyle adherence, improved motivation, and emotional regulation reflecting enhanced self-efficacy. These behavioral transformations correspond with national data suggesting that adequate physical activity and healthy habits improve glycemic control and quality of life (Sokolovska et al., 2020).

Compared with single interventions such as electrical stimulation or progressive muscle relaxation (Vidanage et al., 2022), this combined method yields more consistent metabolic outcomes and reduces psychosocial stress (Yun et al., 2022). Therefore, its implementation in nursing practice should integrate education, supervision, and structured monitoring to ensure sustainable physiological and psychological improvements.

CONCLUSION

The case study of Mrs C, a 50-year-old woman with type 2 diabetes mellitus, shows that combining walking exercise and autogenic relaxation therapy effectively improves blood glucose control and overall well-being. Regular practice three times a week led to lower blood glucose levels, increased endurance, and better adherence to a healthy lifestyle. Walking improved insulin sensitivity and glucose use, while relaxation therapy reduced stress and cortisol. Together, these interventions stabilised blood sugar and enhanced psychological health and self-management.

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