



Analysis of Nursing Care for the Elderly with the Application of Progressive Muscle Relaxation Therapy to Reduce Blood Sugar Levels in Diabetes mellitus

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Abstract

Background of study: The aging process accompanied by a decline in physiological and psychological functions makes the elderly more susceptible to impaired blood glucose control. Type II diabetes mellitus is one of the most common chronic diseases experienced by the elderly and is a major health problem because it can reduce the quality of life and increase the risk of various complications.

Aims and scope of paper: This application aims to analyze nursing care for Mrs. R and Mrs. M and evaluate the application of progressive muscle relaxation therapy in lowering blood sugar levels in type II diabetes mellitus at the UPT PSTW Husnul Khotimah, Riau Province Social Service correctly, precisely and in accordance with professional nursing standards.

Methods: The application method uses a case study with an evidence-based nursing approach totaling 2 subjects. This research instrument uses an observation sheet. The intervention time is 15 minutes in the time span from 10:00-11:00 WIB.

Result: The results of random blood sugar levels (<200 mg/dl) for 3 days with an average value before therapy of 263 mg/dl and after therapy of 225 mg/dl.

Conclusion: The conclusion of progressive muscle relaxation therapy have been proven to reduce blood sugar levels.

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INTRODUCTION

Aging is a natural and unavoidable biological process experienced by every individual throughout life. This process involves a series of physiological, psychological, and social transformations that progressively reduce the body's capacity to maintain internal balance when faced with various internal and external challenges. The World Health Organization (WHO, 2020) defines elderly individuals as those who have reached the age of 60 years or older. In line with this, the Indonesian Ministry of Health (Kemenkes, 2023) further classifies the elderly into two groups: young elderly (60-69 years) and old elderly (≥ 70 years). With advancing age, the performance of vital organ systems including the endocrine, cardiovascular, digestive, and metabolic systems undergoes a gradual decline, rendering older adults particularly vulnerable to degenerative conditions (Wijonarko, 2023).

The rapid growth of the elderly population globally, including in Indonesia, has become a pressing concern for health systems worldwide. Data released by the Central Statistics Agency (BPS, 2023) indicate that older adults currently constitute approximately 11.75% of the total Indonesian population, with projections showing a continued upward trend in the years ahead.

Based on the author's preliminary field assessment, the UPT PSTW of Riau Province accommodates a total of 90 elderly residents. The expanding elderly population is closely associated with a higher burden of non-communicable diseases (NCDs), including hypertension, coronary artery disease, stroke, and diabetes mellitus ([Sellynia Herwin Julieta et al., 2023](#)).

[The Indonesian Ministry of Health \(2023\)](#) reports that diabetes mellitus (DM) ranks among the leading chronic illnesses affecting the elderly population in the country. National surveillance data from the 2023 Basic Health Research (Riskesmas) revealed a notable rise in diabetes prevalence, climbing from 2.0% in 2018 to 3.2% in 2023. Consistent with this trend, the author's preliminary study identified 13 elderly residents at the study site who had been diagnosed with diabetes mellitus. This growing prevalence is attributed to prolonged life expectancy alongside shifts in health behaviors, particularly the adoption of diets rich in refined sugars and saturated fats, reduced engagement in physical activity, and heightened psychosocial stress. As a consequence, elderly individuals living with diabetes mellitus frequently experience a decline in overall quality of life stemming from chronic complications such as neuropathy, retinopathy, nephropathy, and cardiovascular disease ([Bistara, 2021](#)).

Diabetes mellitus encompasses a cluster of metabolic disorders defined by persistent hyperglycemia arising from defects in insulin secretion, insulin action, or a combination of both ([PERKENI, 2021](#)). Under normal circumstances, insulin serves as the primary regulator of glucose metabolism. When insulin production or its cellular response is compromised, blood glucose concentrations rise progressively, predisposing individuals to a wide range of complications. Among the elderly, this metabolic dysfunction is frequently compounded by age-related changes including reduced insulin sensitivity in peripheral tissues, diminished physical activity levels, and disruptions in fat and carbohydrate metabolism ([Juniarti et al., 2021](#)).

Beyond physiological mechanisms, psychological determinants are equally important in the regulation of blood glucose among individuals with diabetes mellitus. Elderly patients managing chronic conditions such as diabetes are at elevated risk of experiencing stress, emotional distress, and depressive symptoms, driven by functional limitations and significant life adjustments. When psychological stress occurs, the body responds by secreting hormones such as cortisol and adrenaline, which activate gluconeogenesis in the liver and impair insulin effectiveness, ultimately contributing to sustained hyperglycemia. Consequently, a comprehensive approach to diabetes management must extend beyond pharmacological interventions to encompass complementary non-pharmacological strategies ([Ningsih Lase, 2025](#)).

The management of diabetes mellitus generally follows two broad therapeutic pathways: pharmacological treatment, which relies on antidiabetic agents such as metformin or insulin, and non-pharmacological treatment, which encompasses lifestyle modification and nursing-based interventions. Non-pharmacological options cover a range of strategies including nutritional regulation, structured physical exercise, psychosocial stress reduction, and relaxation-based techniques. Among these, progressive muscle relaxation therapy has emerged as a particularly viable approach due to its practicality and demonstrated efficacy in clinical nursing settings ([Widyanti Vaningrum et al., 2024](#)).

Progressive muscle relaxation (PMR) was originally developed by Edmund Jacobson in 1938, grounded in the concept that muscular tension and emotional distress share a direct reciprocal relationship. Under conditions of stress, skeletal muscles contract involuntarily as part of the body's physiological response; through a structured sequence of alternating muscle contraction and release targeting specific muscle groups, individuals can attain a profound state of physical and psychological relaxation ([Simanjuntak et al., 2022](#)).

In the context of elderly patients with diabetes mellitus, progressive muscle relaxation holds significant therapeutic value by attenuating both physiological and psychological stress responses that contribute to blood glucose dysregulation. Its primary mechanism involves the enhancement of parasympathetic nervous system dominance, which suppresses stress hormone secretion and facilitates cellular glucose uptake. Additionally, the relaxation response promotes improved peripheral circulation and enhanced tissue oxygenation, supporting more effective glucose metabolism throughout the body. A growing body of evidence supports the efficacy of this intervention: [Wulandari et al. \(2021\)](#) demonstrated that a five-day PMR program produced

statistically significant reductions in fasting blood glucose among elderly patients with diabetes mellitus, yielding a p-value of 0.000.

From a practical standpoint, PMR carries additional advantages: it demands no specialized equipment, can be executed with minimal effort, and is suitable for instruction by nurses within the scope of independent nursing practice. This characteristic resonates with the holistic nature of nursing care, which addresses not only physical health but also the psychological and social dimensions of patient well-being. Given these benefits, incorporating progressive muscle relaxation into nursing care plans for elderly patients with diabetes mellitus represents a meaningful strategy for supporting glycemic management ([Aminiyah et al., 2022](#)).

In view of the substantial burden that diabetes places on the elderly population and the far-reaching consequences it entails, sustained and proactive disease management is imperative. Nurses, occupying a central position on the healthcare team, bear considerable responsibility in delivering integrated nursing care that encompasses health education, psychosocial support, and the introduction of evidence-based non-pharmacological therapies including progressive muscle relaxation. With consistent and proper application, this therapeutic approach is anticipated to support patients in achieving better glycemic control, alleviating stress burden, and minimizing the risk of long-term diabetes-related complications.

METHOD

This Final Scientific Paper for Nurses uses a descriptive case study design. This case study research begins with assessment, diagnosis, intervention, implementation, and evaluation using an evidence-based nursing approach with 2 subjects. This research was conducted on December 1-3, 2025. The implementation instrument used an observation sheet. The intervention was administered for 15 minutes, from 10:00 to 11:00 a.m. WIB. This case study focuses on nursing care for Mrs. R and Mrs. M with the application of progressive muscle relaxation therapy in reducing blood sugar levels in type II diabetes mellitus at the UPT PSTW Husnul Khotimah, Riau Province Social Service.

RESULTS AND DISCUSSION

Nursing Assessment

Nursing assessment was performed on two clients presenting with a confirmed medical diagnosis of Diabetes Mellitus. Through a thorough review of the assessment data, the author identified multiple contributing factors to the onset of Diabetes Mellitus in both individuals, with age emerging as a primary determinant. Both clients fell within the elderly age range: Mrs. R was 68 years old and Mrs. M was approximately 65 years of age. This finding is consistent with evidence from [PERKENI \(2021\)](#), which notes that the prevalence of Diabetes Mellitus rises significantly with advancing age, particularly among individuals over 60 years.

The biological aging process is accompanied by a progressive deterioration in physiological functioning, notably including a reduction in insulin sensitivity and impaired pancreatic beta cell activity. The diminished capacity of the pancreas to secrete adequate amounts of insulin, combined with the development of insulin resistance in peripheral tissues, results in disrupted glucose metabolism and subsequent elevation of blood glucose concentrations. Moreover, age-associated alterations in body composition—particularly the accumulation of adipose tissue and the loss of skeletal muscle mass—further exacerbate insulin resistance, representing a fundamental pathophysiological mechanism in the development of type 2 diabetes mellitus ([Smeltzer & Bare, 2020](#)).

Another factor contributing to the development of diabetes mellitus is gender. This is in line with research by the Indonesian Ministry of Health (2020), which states that the incidence of diabetes mellitus tends to be higher in men than in women in the adult and elderly age groups. Men have a greater risk of insulin resistance related to a more dominant distribution of visceral fat. Meanwhile, in women, the risk of diabetes mellitus increases after entering menopause due to a decrease in the hormone estrogen, which previously played a role in maintaining insulin

sensitivity and glucose metabolism. This decrease in estrogen hormone causes postmenopausal women to have a risk almost equal to that of men for developing diabetes mellitus.

Based on the results of the study, the author also identified similarities in the complaints experienced by both clients. Mrs. R and Mrs. M both complained of typical symptoms of Diabetes Mellitus, such as frequent weakness, increased thirst (polydipsia), frequent urination (polyuria), and increased appetite (polyphagia). In addition, both clients also complained of tingling in the extremities and slow-healing wounds. These symptoms arise from chronic hyperglycemia which causes disturbances in carbohydrate, fat, and protein metabolism, as well as microvascular damage and peripheral neuropathy. Uncontrolled hyperglycemia over a long period of time can cause various complications, both acute and chronic, in people with Diabetes Mellitus [\(ADA, 2022\)](#).

Nursing Diagnosis

Based on the assessment results for clients with diabetes mellitus, the priority nursing diagnosis is blood glucose imbalance. This condition occurs due to impaired insulin secretion or function, leading to fluctuations in blood glucose levels above normal. Common manifestations include polyuria, polydipsia, fatigue, and elevated blood glucose levels, necessitating nursing management focused on glycemic control [\(American Diabetes Association, 2023\)](#).

In addition, nursing diagnoses of impaired skin integrity and impaired urinary elimination were also found in clients with diabetes mellitus. Chronic hyperglycemia can cause circulatory impairment and decreased nerve sensitivity, increasing the risk of injury and slowing the healing process. Meanwhile, elevated blood glucose levels trigger osmotic diuresis, leading to polyuria and altered urinary elimination patterns. Therefore, both diagnoses require comprehensive management to prevent further complications [\(International Diabetes Federation, 2022\)](#).

Nursing Interventions

In response to the nursing diagnosis of blood glucose imbalance, the nursing interventions implemented were guided by the Indonesian Nursing Intervention Standards (SIKI), specifically within the framework of hyperglycemia management. The nursing actions encompassed assessment of the client's dietary habits and daily physical activity, routine blood glucose monitoring, surveillance for clinical signs and symptoms of both hyperglycemia and hypoglycemia, provision of patient education regarding nutritional management and medication adherence, as well as collaborative administration of antidiabetic pharmacotherapy according to the prescribed medical regimen. The overarching goal of these interventions was to maintain blood glucose levels within a stable, safe range and to avert potential complications [\(PPNI SIKI Working Group Team, 2018\)](#).

In the nursing diagnosis of impaired skin integrity, the interventions provided are wound care and skin care according to the SIKI. Nursing actions include assessing the condition of the skin and wounds, maintaining skin cleanliness and moisture, monitoring for signs of infection, protecting at-risk skin areas, and educating about diabetic foot care. Meanwhile, for the diagnosis of impaired urinary elimination, the nursing interventions carried out are urinary elimination management, which includes monitoring urinary patterns and frequency, observing the amount and characteristics of urine, educating about fluid intake, and monitoring the impact of hyperglycemia on elimination patterns. All of these interventions aim to improve client comfort, prevent complications, and support the achievement of optimal nursing outcomes [\(PPNI SIKI Working Group Team, 2018\)](#).

Nursing Implementation

Progressive muscle relaxation therapy was delivered to both Mrs. R and Mrs. M across three consecutive sessions conducted on December 1–3, 2025, scheduled between 10:00 and 11:00 WIB. Each session lasted approximately 15 minutes. Prior to commencing the intervention, the nurse completed a pre-interaction phase involving preparation of a conducive and comfortable environment and assisting the client into an appropriate sitting or recumbent position. During the orientation phase, the nurse introduced herself to the client, confirmed the

client's identity, clearly explained the objectives and procedural steps of progressive muscle relaxation therapy, and obtained the client's informed consent before proceeding.

During the working phase, the nurse guided the client through a structured sequence of progressive muscle relaxation exercises involving the deliberate tensing and releasing of muscle groups in a systematic order, progressing from the lower limbs up toward the facial musculature, while integrating controlled diaphragmatic breathing throughout. Blood glucose measurements were obtained both before and after each session to monitor the physiological response elicited by the intervention. In the termination phase, the nurse reviewed the outcomes of the session with the client, delivered constructive feedback, and motivated the client to continue performing progressive muscle relaxation exercises independently on a regular basis as an ongoing self-management strategy for Diabetes mellitus.

Nursing Evaluation

Post-intervention evaluation revealed a measurable reduction in blood glucose concentrations in both clients following the completion of progressive muscle relaxation therapy. From a subjective standpoint, both Mrs. R and Mrs. M reported heightened feelings of relaxation, improved bodily comfort, and a noticeable decrease in fatigue complaints following each session. Objectively, both clients demonstrated a calmer demeanor and visibly reduced muscle tension. Blood glucose measurement results confirmed a downward trend, with Mrs. R's levels decreasing from 235 mg/dL to 218 mg/dL, and Mrs. M's from 289 mg/dL to 264 mg/dL. These findings indicate a positive clinical response, reflecting an improvement in the nursing problem of blood glucose imbalance. The care plan was continued with reinforcement encouraging both clients to maintain consistent and independent practice of progressive muscle relaxation as part of their ongoing glycemic management.

Table 4.1 decrease in Mrs. R's blood sugar levels

| Mrs. R | Pre Test | Post Test |
|-------------------|-----------------|------------------|
| First Day | 235 mg/dl | 218 mg/dl |
| Second Day | 220 mg/dl | 187 mg/dl |
| Third Day | 200mg/dl | 174 mg/dl |

Table 4.2 decrease in Mrs. M's blood sugar levels

| Mrs. M | Pre Test | Post Test |
|-------------------|-----------------|------------------|
| First Day | 289 mg/dl | 264 mg/dl |
| Second Day | 277 mg/dl | 251 mg/dl |
| Third Day | 264 mg/dl | 248 mg/dl |

This is in line with research by [Aminiyah et al., \(2021\)](#), progressive muscle relaxation therapy has been proven to be able to reduce the activity of the sympathetic nervous system, reduce heart rate, blood pressure, and cortisol levels in the blood with the results of the dependent T-Test before and after the intervention, namely ($p < 0.005$) and ($p < 0.005$) which means that progressive muscle relaxation techniques have an effect on reducing blood glucose levels.

This is also in line with research by [Wulandari et al. \(2021\)](#) which showed that administering progressive muscle relaxation therapy for 5 days can significantly reduce fasting blood sugar levels in elderly people with diabetes mellitus with a p-value of 0.000. Another study by [Kusnanto et al. \(2020\)](#) also stated that progressive muscle relaxation training can reduce serum cortisol levels and blood sugar levels in type 2 diabetes patients at the Mojokerto Community

Health Center with results in the intervention group with $p < 0.001$ and the control group with $p = 0.093$.

Analysis Based on Intervention Implementation

The implementation of progressive muscle relaxation therapy intervention in clients with diabetes mellitus is based on a nursing diagnosis of blood glucose imbalance related to impaired insulin regulation and physiological and psychological stress. This intervention was chosen because it is non-pharmacological, safe, easy to implement, and appropriate for the condition of clients with diabetes mellitus, especially the elderly, who often experience fluctuating blood sugar levels due to stress and muscle tension. Progressive muscle relaxation therapy aims to help clients achieve a state of physical and mental relaxation that can support blood glucose control.

The intervention was implemented routinely for three consecutive days, lasting approximately 15 minutes each session. Prior to the intervention, the author measured blood sugar levels using a glucometer as baseline data. Next, the client was guided through systematic progressive muscle relaxation, starting with the lower extremity muscle groups and progressing to the upper extremities and facial muscles, using alternating muscle tension and relaxation techniques, accompanied by deep breathing. After the relaxation session, blood sugar levels were measured again to assess any changes.

The results of the intervention showed a gradual and consistent decrease in blood sugar levels from the first to the third day. At the beginning of the intervention, the client's blood sugar levels were above normal, then decreased over several days of therapy, until they reached closer to normal levels on the final day. This decrease indicates that progressive muscle relaxation therapy has a positive effect on blood glucose control in clients with diabetes mellitus.

From a physiological perspective, progressive muscle relaxation exerts its effects by shifting autonomic nervous system balance away from sympathetic dominance and toward parasympathetic activation. This induced relaxation state leads to a measurable decrease in circulating stress hormones, particularly cortisol and catecholamines, which are known to elevate blood glucose through the processes of gluconeogenesis and glycogenolysis. As concentrations of these hormones decline, cellular insulin sensitivity is restored, thereby enhancing the body's efficiency in utilizing blood glucose. This underlying mechanism accounts for the sustained reductions in blood glucose observed in both clients following consistent practice of progressive muscle relaxation therapy.

Recommendations from Related Parties

The delivery of nursing care incorporating progressive muscle relaxation therapy produced notable positive outcomes in the health status of clients diagnosed with diabetes mellitus. This intervention merits wider recommendation given its proven capacity to reduce blood glucose levels by addressing stress and muscular tension, thereby modulating the hormonal pathways involved in glucose regulation. The clinical benefit is reflected in the consistent blood glucose reductions observed following regular participation in PMR sessions. Beyond its physiological impact, the therapy concurrently yielded psychological gains, including enhanced tranquility and a heightened sense of comfort among clients. It is therefore recommended that elderly care services—particularly those provided by nurses and social welfare personnel at the UPT Husnul Khotimah Social Service of Riau Province—more actively integrate progressive muscle relaxation therapy into routine non-pharmacological nursing interventions for elderly clients living with diabetes mellitus.

Limitations of Application

Based on the implementation results, several obstacles were identified during nursing care. These included a less-than-conducive environment, making it difficult for patients to feel at ease during progressive muscle relaxation therapy. One elderly person had difficulty signing the informed consent form due to a writing disability, requiring additional assistance from the author. Furthermore, the author experienced limitations in the number of respondents in this implementation, which impacted the number of patients involved. Consequently, this

implementation only included an intervention group and could not be compared with a control group.

CONCLUSION

Based on the outcomes of the non-pharmacological nursing care program utilizing progressive muscle relaxation therapy, which was implemented from December 1 to December 3, 2025, between 10:00 and 11:00 a.m. Western Indonesian Time (WIB) at the Husnul Khotimah PSTW Technical Implementation Unit (UPT PSTW) of the Riau Provincial Social Service, it can be concluded that this therapeutic approach is effective in reducing blood glucose levels in elderly clients with unstable glycemic control. Both Mrs. R and Mrs. M demonstrated progressive reductions in blood glucose readings across all three intervention days, with measurements recorded each morning during the designated time window, confirming the beneficial effect of consistent PMR application on blood sugar management.

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AUTHOR CONTRIBUTION STATEMENT

The first author was involved in research planning, data collection and analysis, and drafting the Nursing Final Scientific Paper. The second author provided academic direction, provided research methodology guidance, provided critical review, and revised and refined the manuscript. Both authors are responsible for the content of this Nursing Final Scientific Paper.

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