

The Effect of Progressive Muscle Relaxation on Depression and Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disease that is often accompanied by psychological disorders, particularly depression, which may adversely affect glycemic control and quality of life. Progressive Muscle Relaxation (PMR) is a complementary non-pharmacological intervention with the potential to improve both psychological and physiological outcomes in patients with T2DM. This study aimed to determine the effect of Progressive Muscle Relaxation on depression and blood glucose levels in patients with Type 2 Diabetes Mellitus. A pre-experimental study using a one-group pretest-posttest design was conducted at the Internal Medicine Polyclinic of Majalengka Regional Hospital in 2026. A total of 35 patients with Type 2 Diabetes Mellitus were selected using purposive sampling. Depression was measured using the Beck Depression Inventory-II (BDI-II), while blood glucose levels were assessed using random blood glucose testing. Data were analyzed using the paired-samples *t*-test and the Wilcoxon signed-rank test, with a significance level of $p < 0.05$. The mean depression score decreased from 18.43 to 16.80, while the mean random blood glucose level decreased from 231.89 mg/dL to 190.26 mg/dL after the intervention. Statistical analysis showed that Progressive Muscle Relaxation significantly reduced depression ($p < 0.001$) and random blood glucose levels ($p = 0.002$). Progressive Muscle Relaxation was associated with improvements in depression scores and random blood glucose levels among patients with Type 2 Diabetes Mellitus. PMR may serve as a complementary nursing intervention to support comprehensive diabetes management.

Keywords: Blood glucose, depression, nursing, progressive muscle relaxation, Type 2 Diabetes Mellitus

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia resulting from impaired insulin secretion, impaired insulin action, or both. The disease is a major global health problem due to its increasing prevalence each year. The International Diabetes Federation (IDF) reports that the number of people with diabetes worldwide continues to increase

and is projected to rise further in the coming years. In Indonesia, Diabetes Mellitus is also a major non-communicable disease with a high prevalence, requiring comprehensive management to prevent complications and improve patients' quality of life (PERKENI, 2021; International Diabetes Federation, 2023).

In addition to causing various physical complications, Type 2 Diabetes Mellitus also affects patients' psychological well-being, particularly by increasing the risk of depression. Depression may reduce patients' motivation to undergo treatment, decrease adherence to therapy, negatively affect dietary habits and physical activity, and worsen blood glucose control. These conditions ultimately increase the risk of complications and reduce patients' quality of life (Della *et al.*, 2023; Perdana *et al.*, 2022; Lase *et al.*, 2023). Research by Setyowati *et al.* (2026) showed that patients with Type 2 Diabetes Mellitus experienced varying levels of depression, including mild, moderate, and severe depression, based on the Beck Depression Inventory-II (BDI-II). These findings suggest that depression is an important psychological problem that requires attention in the management of patients with Type 2 Diabetes Mellitus.

One non-pharmacological intervention that can be implemented to help address psychological problems in patients with Diabetes Mellitus is Progressive Muscle Relaxation (PMR). This relaxation technique involves systematically tensing and relaxing muscle groups to induce a relaxation response. Several studies have reported that PMR can reduce muscle tension, alleviate stress and depression, and positively affect blood glucose control by reducing sympathetic nervous system activity and stress hormone levels (Agung *et al.*, 2022; P. Sari & Harmanto, 2020).

Based on a preliminary study conducted at the Internal Medicine Polyclinic of Majalengka Regional Hospital, the number of visits by patients with Type 2 Diabetes Mellitus remained relatively high, and interview findings indicated that some patients experienced emotional changes leading to depressive symptoms accompanied by suboptimal blood glucose control. Although several studies have reported the benefits of PMR for the psychological and physiological conditions of patients with Diabetes Mellitus, studies evaluating its effect on depression and blood glucose levels simultaneously among patients with Type 2 Diabetes Mellitus receiving outpatient care remain limited, particularly in Majalengka Regency. Therefore, this study aimed to analyze the effect of Progressive Muscle Relaxation on depression and blood glucose levels in patients with Type 2 Diabetes Mellitus at the Internal Medicine Polyclinic of Majalengka Regional Hospital.

METHODS

This study employed a pre-experimental design using a one-group pretest-posttest design. The study was conducted at the Internal Medicine Polyclinic of Majalengka Regional Hospital in 2026. The study population consisted of 2,128 outpatients with Type 2 Diabetes Mellitus. A sample of 35 respondents was selected using a purposive sampling technique.

The inclusion criteria for this study were patients who had been diagnosed with Type 2 Diabetes Mellitus by a medical professional, were undergoing treatment at the Internal Medicine Polyclinic of Majalengka Regional Hospital, and were willing to participate by providing written informed consent. Respondents who did not complete the entire study were excluded from the analysis.

The Beck Depression Inventory-II (BDI-II) was used to measure depression levels, while random blood glucose levels were measured using a Sinocare glucometer. Measurements were conducted twice: before the intervention (pretest) and after the intervention (posttest).

The intervention consisted of Progressive Muscle Relaxation (PMR) performed twice daily for three consecutive days (Noor *et al.*, 2021), with each session lasting approximately 15–25 minutes (Rafli *et al.*, 2025). The intervention followed the Standard Operating Procedure (SOP)

for Progressive Muscle Relaxation, which systematically involves the contraction and relaxation of muscle groups, beginning with the head, face, neck, shoulders, arms, hands, chest, abdomen, and finally the lower legs and feet (Syokumawena *et al.*, 2022).

Data were analyzed using univariate analysis to describe respondent characteristics and bivariate analysis to evaluate the effect of the intervention. Data normality was assessed using the Shapiro–Wilk test. Depression levels were analyzed using the paired-samples *t*-test, while random blood glucose levels were analyzed using the Wilcoxon signed-rank test, with a significance level of $p < 0.05$.

This study received ethical approval from the Research Ethics Committee of Universitas YPIB Majalengka under approval number 002710/Universitas YPIB Majalengka/2026. All respondents received an explanation of the study objectives and procedures and provided written informed consent before participating in the study.

RESULTS

Table 1 shows that the mean depression score before the intervention was 18.43 and decreased to 16.80 after Progressive Muscle Relaxation. The paired-samples *t*-test showed a statistically significant difference ($p < 0.001$).

Table 1. Effect of Progressive Muscle Relaxation on Depression

Variable	Mean	SD	Mean Difference	t	p-value
Pre	18.43	7.701			
Post	16.80	7.058	1.629	7.013	<0.001

Table 2 shows that the median random blood glucose level decreased from 218 mg/dL before the intervention to 177 mg/dL after Progressive Muscle Relaxation. The Wilcoxon signed-rank test showed a statistically significant difference ($p = 0.002$).

Table 2. Effect of Progressive Muscle Relaxation on Blood Glucose Level

Variable	Median Pre	Median Post	Negative Ranks (n)	Positive Ranks (n)	Z	p-value
Random blood glucose	218	177	27	8	-3.079	0.002

DISCUSSION

The present study demonstrated significant reductions in depression scores and random blood glucose levels following the PMR intervention. Specifically, the mean depression score decreased from 18.43 to 16.80 ($p < 0.001$), while the mean random blood glucose level decreased from 231.89 mg/dL to 190.26 mg/dL ($p = 0.002$). These findings suggest that PMR may serve as a complementary nursing intervention to support comprehensive diabetes management.

The reduction in depression after PMR administration can be explained by the relaxation mechanism that activates the parasympathetic nervous system, thereby reducing muscle tension, increasing comfort, and helping to regulate the stress response. Parasympathetic activation contributes to a decrease in stress hormones, such as cortisol, resulting in more stable emotional states in patients (Redina Cahyani & Tasalim, 2024). The findings of the present study are consistent with those reported by Asnaniar and Agustini (2018), who demonstrated that Progressive Muscle Relaxation reduced depression severity among older adults, with participants improving from severe depression to mild depression or even achieving normal psychological status following the intervention. Although the magnitude of improvement cannot be directly compared because the previous study reported categorical changes in depression severity, whereas the present study used mean BDI-II scores, both studies consistently demonstrate the beneficial psychological effects of PMR. Variations in participant characteristics, study design,

intervention duration, and outcome measurements may explain differences in the observed treatment effects across studies. Furthermore, these findings support the research of Setyowati *et al.* (2026), which reported that depression is a common psychological problem in patients with Type 2 Diabetes Mellitus, requiring appropriate intervention.

Although the reduction in depression scores was statistically significant, its clinical significance should also be considered. The observed improvement suggests better emotional well-being, which may enhance patients' adherence to diabetes treatment, promote self-care behaviors, and improve overall quality of life. Therefore, PMR should be considered as a complementary intervention that supports comprehensive diabetes management rather than a replacement for standard medical therapy.

The findings of the present study suggest that PMR may contribute to improvements in random blood glucose levels among patients with Type 2 Diabetes Mellitus. The relaxation achieved during the intervention is thought to reduce sympathetic nervous system activity and the secretion of stress hormones, which play a role in increasing blood glucose. When the stress response is reduced, insulin sensitivity can improve, resulting in more optimal glucose control. The results of this study align with those of Juniarti *et al.* (2021) and P. Sari and Harmanto (2020), who reported that Progressive Muscle Relaxation (PMR) reduced blood glucose levels in patients with Type 2 Diabetes Mellitus.

The present study demonstrated a reduction in mean random blood glucose levels of approximately 41.63 mg/dL following the PMR intervention. Although previous studies similarly reported beneficial effects of PMR on glycemic control, differences in the magnitude of improvement may be related to variations in participant characteristics, baseline glycemic status, intervention protocols, medication adherence, dietary intake, physical activity, and the timing of blood glucose measurements. These factors should be considered when interpreting the findings and comparing them across studies.

The observed reduction in random blood glucose levels suggests that PMR may contribute to short-term improvements in glycemic control when used alongside standard diabetes management. Therefore, PMR should be considered as a complementary intervention rather than a replacement for pharmacological therapy.

The findings of this study have implications for nursing practice, particularly in outpatient care. During the study, patients generally experienced a waiting period between laboratory testing and medical consultation. This waiting period may provide an opportunity to implement simple supportive interventions, such as Progressive Muscle Relaxation (PMR). Because PMR requires no special equipment, is easy to learn, and can be performed independently, it has the potential to be incorporated into routine nursing care as a complementary intervention to support psychological well-being and glycemic control in patients with Type 2 Diabetes Mellitus.

This study has several limitations that should be considered when interpreting the findings. First, the one-group pretest-posttest design without a control group limits the ability to attribute the observed changes solely to the Progressive Muscle Relaxation intervention. Second, the relatively small sample size and the single-center setting may limit the generalizability of the findings. In addition, the use of purposive sampling may have introduced selection bias, as the participants may not fully represent the broader population of patients with Type 2 Diabetes Mellitus. Furthermore, several potentially influential factors, including concurrent diabetes treatment, medication adherence, dietary intake, physical activity, and other lifestyle-related variables, were not controlled during the study. These factors may have influenced both depression scores and blood glucose levels, thereby contributing to the observed outcomes. Therefore, the findings should be interpreted cautiously, and future studies employing randomized controlled designs with larger samples and better control of potential confounding variables are recommended.

CONCLUSION

The findings of this study suggest that Progressive Muscle Relaxation (PMR) was associated with improvements in depression scores and random blood glucose levels among patients with Type 2 Diabetes Mellitus treated at the Internal Medicine Polyclinic of Majalengka Regional Hospital. These findings indicate that PMR may serve as a simple, safe, and complementary non-pharmacological intervention to support standard diabetes management by improving psychological and physiological outcomes. However, further studies using more rigorous research designs, including controlled trials with larger samples, are needed to confirm the effectiveness of PMR in patients with Type 2 Diabetes Mellitus.

RECOMMENDATION

Based on the findings of this study, Progressive Muscle Relaxation (PMR) may be considered a complementary non-pharmacological intervention for patients with Type 2 Diabetes Mellitus, particularly in outpatient settings. Nurses may provide education and supervision to ensure that patients perform PMR correctly, with sessions lasting approximately 15–25 minutes twice daily, as implemented in the present study. Incorporating PMR into routine nursing care may help support patients' psychological well-being and short-term glycemic control alongside standard medical treatment.

Future studies are recommended to employ randomized controlled trial designs with larger sample sizes, longer follow-up periods, and multiple healthcare settings to improve the strength and generalizability of the findings. In addition, future research should consider using objective indicators of long-term glycemic control, such as glycated hemoglobin (HbA1c), while controlling for potential confounding factors, including medication adherence, dietary intake, and physical activity, to provide stronger evidence regarding the effectiveness and sustainability of PMR in patients with Type 2 Diabetes Mellitus.

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