

# *Prolanis* Gymnastic Intervention and Autogenic Relaxation on Blood Sugar Levels and Stress Levels among Type 2 Diabetes Mellitus Patients

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Article info	Abstract
<p><b>Article history:</b> Received: October 7<sup>th</sup>, 2022 Revised: November 14<sup>th</sup>, 2022 Accepted: December 9<sup>th</sup>, 2022</p> <hr/> <p><b>Correspondent author:</b> Name: Nur Rezki Address: Poltekkes Kemenkes Semarang, Jl. Tirta Agung 50268 Semarang Jawa Tengah, Indonesia E-Mail: <a href="mailto:rezkinur19@gmail.com">rezkinur19@gmail.com</a></p>	<p><b>Background:</b> Hyperglycemia in people with diabetes mellitus can be motivated by stress factors which include physical, biological, psychological, and socio-cultural stress. The nurse's role in implementing diabetes mellitus management will be able to provide a reduction in stress levels and increase the ability of self-care in self-controlling blood sugar levels of people with diabetes. Non-pharmacological management, such as <i>prolanis</i> gymnastic and autogenic relaxation, could control blood sugar levels and stress levels in patients with type 2 diabetes mellitus. <b>Objective:</b> The study aims to determine the effectiveness of <i>prolanis</i> gymnastic and autogenic relaxation on fasting blood sugar levels and stress levels among type 2 diabetes mellitus patients. <b>Design:</b> This study applied the Quasi Experiment study pre-test and post-test with a control group design. <b>Result:</b> Repeated Measure, ANOVA test, showed a significant difference between the mean fasting blood sugar level and stress level with p=value 0.000 (&lt;0.05). Independent T-test showed a significant difference between the intervention group and control group on fasting blood sugar levels and stress levels after the post-test in the third week. The intervention group is better at lowering fasting blood sugar levels and stress levels than the control group seen from the higher value difference. <b>Conclusion:</b> This study concludes that <i>prolanis</i> gymnastic and autogenic relaxation three times a week for three weeks effectively reduce fasting blood sugar levels and stress levels in patients with type 2 diabetes mellitus. <b>Recommendation:</b> This study can be used for reference for future research, controlling the patient's diet, lifestyle, etc., and longer duration of intervention so that the result obtained is more valid</p>
<p>International Journal of Nursing and Health Services (IJNHS) Volume 5, Issue 6, December 20<sup>th</sup>, 2022 DOI: 10.35654/ijnhs.v5i6.649 E-ISSN: 2654-6310</p>	<p><b>Keywords:</b> <i>prolanis</i> gymnastic, autogenic relaxation, fasting blood sugar levels, stress levels, type 2 Diabetes Mellitus</p> <p>This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License CC BY -4.0</p>



## INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disorder with multiple etiologies characterized by high blood sugar levels and impaired carbohydrate, lipid, and protein metabolism resulting from insulin function insufficiency (1). Currently, Diabetes Mellitus is a chronic problem and continues to grow. This fact is evidenced by a report from the International Diabetes Federation (IDF), which that the prevalence of people with Diabetes Mellitus worldwide in 2017 was 425 million people and is estimated to increase to 629 million sufferers in 2045 (2). Hyperglycemia in people with diabetes mellitus can be motivated by stress factors which include physical, biological, psychological, and socio-cultural stress (3).

The nurse's role in implementing diabetes mellitus management would be able to provide a reduction in stress levels and increase the ability of self-care in self-controlling blood sugar levels of diabetics (4). Therefore, the goal of reducing chronic complications due to diabetes mellitus is achieved. The management of patients with type 2 diabetes mellitus is non-pharmacological, namely physical exercise.

Physical exercise is considered necessary because it is closely related to the quality of life of people with diabetes in reducing complaints, maintaining a sense of comfort with the disease, preventing further complications, and reducing morbidity (5). Prolanis gymnastics for diabetics is a physical activity designed based on age and physical status. It aims to prevent injuries, strengthen muscles, and accelerate blood circulation, stimulating insulin receptors to be more active, which can impact the lowering of blood glucose in diabetic patients (6).

Several studies have shown a significant effect of prolanis gymnastics on reducing blood sugar levels. Research conducted by Nastiti through prolanis gymnastics for diabetics, which was carried out four times a month for two months, affected decreasing fasting blood sugar levels and 2 hours postprandial blood sugar in 54 samples with a percentage of 7.6%

(High), 21% (disturbed), 71% (normal) and the average value is 120.98 (7).

Complementary therapy can also reduce blood sugar and stress levels in patients with type 2 diabetes mellitus non-pharmacologically. In addition to not having side effects caused by pharmacological treatment, complementary therapies are cheap and easy to implement (8). Relaxation is a form of exercise and has a good function in stabilizing blood sugar levels through stabilizing cortisol levels as an effect of decreasing anxiety and stress levels. If done regularly, it can reduce stress levels that cause high blood sugar levels in patients by inhibiting the production of stress-causing hormones such as cortisol in the adrenal glands from reducing the dose or frequency of insulin use.

Relaxation techniques with movements and instructions that are simpler and more time efficient than other relaxation techniques are autogenic relaxation. Autogenic relaxation is a relaxation technique using a series of self-focused attention and body awareness to create a feeling of calm, thereby reducing stress levels (9). This is achieved by relaxing blood vessels so that blood flow to the pancreas will be smooth. Improved blood circulation is meant to bring in the elements needed to improve and create balance with the environment.

Previous research has provided evidence that giving autogenic relaxation has a good impact on the stability of blood sugar levels. The study by Hidayat and Jumilah, through autogenic relaxation intervention for 15 minutes as much as three times exercise for 3 days, was able to reduce the average blood sugar level from 195.32 mg/dL to 136.47 mg/dL ( $p=0.000$ ). Meanwhile, in the control group who were not given autogenic relaxation intervention but only followed the doctor's advice, namely maintaining diet and taking medication in this study, there was no significant decrease in blood sugar levels ( $p = 0.127$ )(10).

Other studies provide evidence that in addition to blood sugar, autogenic relaxation

also positively impacts reducing stress levels. Syafitri's research uses the Quasi Experiment method, pre-test, and post-test non-equivalent control group. The intervention group was given autogenic relaxation 2 times a day for 3 days to see a decrease in stress levels in research respondents. The results show a significant value between pre and post-autogenic relaxation of  $p = 0.000$  ( $p < 0.05$ ), which means there is a decrease in stress levels with 11 people in the mild stress category and 4 people in the moderate category and no respondents experiencing severe stress after intervention (11).

So far, the existing research only uses one variable, prolanis gymnastic and autogenic relaxation, each aimed at reducing blood sugar levels in people with diabetes mellitus and stress levels.

The effectiveness of the two interventions has been proven in previous studies on controlling blood sugar levels and stress levels. No research reveals that prolanis gymnastics is done regularly three times a week for 30 minutes, followed by autogenic relaxation, which is also routinely done for 30 minutes 3 times a week. A duration of 20 minutes has a better effect on the stability of blood sugar levels and stress levels in patients with type 2 diabetes mellitus. Even though previous studies had a statistically significant impact, the decrease was not clinically significant.

The prolanis gymnastic and autogenic relaxation intervention reduce blood sugar and stress levels. In the clinical stage, with fasting blood sugar levels and stress levels reaching or approaching the normal range, with a much larger effect size than only providing *prolanis* gymnastic or autogenic relaxation.

Moreover, until now, at the health center, prolanis gymnastics is only given once a week or not done regularly. Thereby, autogenic relaxation would also introduce complementary therapies, especially autogenic relaxation, which can be used to control blood sugar levels and reduce stress levels in people with type 2 diabetes mellitus. There is no research from the

existing that combines prolanis gymnastic and autogenic relaxation on blood sugar levels and stress levels in diabetes mellitus sufferers. Researchers are interested in combining the two, which are expected to provide more optimal results in controlling blood sugar levels and stress in people with diabetes mellitus.

## OBJECTIVE

The study aims to determine the effectiveness of prolanis gymnastic and autogenic relaxation on fasting blood sugar levels and stress levels among type 2 diabetes mellitus patients.

## METHODS

### Design

A quasi-experimental design pre-test and post-test with a control group design were applied in this study. Researchers allocated two groups, including the intervention group, which received the prolanis gymnastic and autogenic relaxation. The control group was not given intervention but received standard treatment from Puskesmas.

### Sample size and sampling technique

This study included all patients with type II diabetes mellitus in Balangnipa Public Health Center and Panaikang Public Health Center. The sample was selected using *purposive sampling* based on inclusion and exclusion criteria. Sixty respondents were divided into two groups, with 30 respondents allocated to the intervention and control groups.

### Intervention

Prolanis gymnastic and autogenic relaxation were given three times a week for three weeks for nine meetings. The intervention group received 3 times a week for 30 minutes, followed by autogenic relaxation, which is also done regularly for 30 minutes 3 times a week.

### Data collection process

In this study, researchers collected data using observation, identification,

interview and filling out observation sheets. The intervention group received the prolanis gymnastic and autogenic relaxation, and the control group was not given intervention but still received treatment according to PHC standards. Prolanis gymnastic and autogenic relaxation were given three times a week for three weeks for nine meetings.

Examination of fasting blood sugar levels using an ISO standardized Açu-check glucometer. Assessment for stress level used a validated DASS instrument. The examination of fasting blood sugar levels of respondents with type 2 diabetes mellitus was carried out before (pre-test) and after the therapy (post-test).

### Data Analysis

The collected data were analyzed by a computerized program and continued with a different test, namely the parametric test (Repeated Measure ANOVA test) and Independent T-Test. The processed data is used to discuss the problem statement, which is then presented in tabular form to conclude.

### RESULTS

Table 1 Frequency distribution of respondents from age, gender, education, and profession based on demographic data

Characteristics	Intervention Group n = 30	Control Group n = 30	p-value
Age Mean±SD (min-max)	51.00±5.754 (42-63)	51.83±5.9 14 (41-62)	0.905
Gender			
Male	0	0	0.51
Female	30 (100%)	30 (100%)	0
Profession			
Housewife	15 (53.3%)	12 (40%)	0.073
Retired	3 (10%)	0	
Farmer	0	15 (50%)	
Civil servant	1 (3.33%)	0	
Entrepreneur	10 (33.3%)	3 (10%)	
Education			
Elementary school	8 (26.7%)	14 (46.67%)	0.155
Junior high school	6 (20%)	6 (20%)	
Senior High school	8 (26.7%)	8 (26.67%)	
High school		2 (6.67%)	

College

Therapy	OHO	29 (96.67%)	30 (100%)	0.31
	Insulin	1 (3.33%)	0	3

Table 1 shows the data on the average age of the highest respondents in the control group, with an average age of 51.83. In the intervention group, the average age of respondents is 51.00. The gender of the respondents in this study was 100% female in both the intervention group and the control group. This is because men in the working areas of the two puskesmas are not actively joining prolanis and working in the morning, so there is no time to participate in *prolanis* activities.

The occupation characteristics of the respondents in the intervention group were primarily homemakers, while in the control group, most respondents were farmers. These results are in accordance with the statistical test, namely the percentage of respondents' occupations as housewives in the intervention group, as much as 53.3%, and the work of farmers in the control group, as much as 50%. This is because the working area of the *Balangnipa* Health Center as the place for the intervention group is in the city area. Therefore, the majority of respondents in this area work as housewives. The control group is the respondents who are members of the *prolanis* in the working area of the *Panaikang* Health Center, which is in the village area. There are still many rice fields and gardens, so most control group respondents are farmers.

The previous educational history of the respondents in this study was the majority of high school students. Univariate analysis showed that a history of high school education had the highest percentage in the intervention group (46.67%). In comparison, the control group had the majority of respondents having the last education in elementary school, with a percentage of 46.67%.

Characteristics of respondents based on drug therapy showed that all respondents used 1 type of therapy, 29 people in the intervention group used OHO, and one person used insulin. Meanwhile, in the control group, all of them used OHO.

Table 2 Analysis of the difference in mean fasting blood sugar levels and stress levels between the intervention group and control group

Variable	Group	Pre-test	Post-test First week	Post-test 2 <sup>nd</sup> week	Post-test third week	F	p-value*
Fasting Blood Sugar	Intervention	204.6	173.07	131.47	97.47	507.22	0.000
	Mean difference		31.567	73.167	107.167		
	Control	190.7	175.60	160.50	144.77	43.753	0.000
	Mean difference		15.1	30.2	45.933		
Stress Levels	Intervention	21.10	17.57	15.70	13.07	106.9	0.000
	Mean difference		3.53	5.40	8.03		
	Control	22.03	20.77	20.75	20.70	13.16	0.069
	Mean difference		1.267	1.28	1.333		

\*Repeated Measure Anova

Table 2 shows significant differences before and after prolanis gymnastic and autogenic relaxation treatment in the intervention group with  $p = 0.000$ . The significance value can be concluded that there are at least two differences between the four fasting blood sugar measurements. The results of the pre-test and post-test differences in the control group with the repeated measure ANOVA test also showed a significant difference in fasting blood sugar levels of respondents who were not given prolanis gymnastic and autogenic relaxation intervention with  $p = 0.000$ . Between the intervention group and the control group, based on the results of Table 2, it is known that the most significant average decrease occurred in the intervention group, which was given prolanis gymnastic and autogenic relaxation.

The table shows that after giving prolanis gymnastic and autogenic relaxation 9 times during the intervention at week 3, the

best average decrease was 107.167, when compared to the different tests between pre-posttest 1 and 2 from the intervention group and the difference test pre-posttest 1, 2, and 3 in the control group. This means that prolanis gymnastic and autogenic relaxation are more effective in controlling fasting blood sugar after being given for 3 weeks or 9 times the intervention.

Table 2 Different test pre-test - post-test intervention and control groups using Repeated Measures ANOVA showed a significant difference in the average stress level of respondents before and after being given prolanis gymnastic and autogenic relaxation in the intervention group with  $p = 0.000$  ( $p < 0.05$ ). In the control group, respondents were not given intervention and only received treatment according to the prolanis program at the public health center. The results showed no significant difference in the stress levels of pre and post-test respondents with  $p\text{-value} > 0.05$ . The difference in the average stress level was better in the results of the 3rd-week pre-posttest in the intervention group, namely 8.033.

Table 3 Analysis of Differences in Post-Test Fasting Blood Sugar Levels and Stress Levels Between the Intervention Group and the Control Group

Variable	Measurement Time	Intervention Group n=30		Control Group n=30		t-value	p-value*
		Mean	SD	Mean	SD		
Fasting Blood Sugar Levels	Post-test first week	173.07	24.655	175.60	26.07	-0.387	0.7
	Post-test 2 <sup>nd</sup> week	131.47	17.902	160.50	28.955	-4.671	0.000
	Post-test third week	97.47	12.773	144.77	32.376	-7.444	0.000
Stress levels	Post-test first week	17.57	2.487	20.77	3.181	-4.341	0.000
	Post-test 2 <sup>nd</sup> week	15.70	2.003	20.75	3.785	-5.799	0.000
	Post-test third week	13.07	1.617	20.70	4.374	-7.204	0.000

The different test used in Table 3 is an independent t-test to see if there is a significant difference in the post-test results of the two groups. Based on Table 4.3, after the Independent T-Test test was carried out. It was obtained a p-value of 0.7 between the post-test week 1 in the intervention group

and the post-test week 1 in the control group. It was indicated that there was no significant difference in fasting blood sugar of respondents in the first week in the intervention group and control group. While the Independent t-test difference test on the respondents' fasting blood sugar in the 2nd and 3rd weeks, it was concluded that there was a significant difference between the 2nd week and 3rd week post-test fasting blood sugar of the intervention group and the control group with p-value = 0.000. The average value of fasting blood sugar in the intervention group after giving 9 times the intervention of prolanis gymnastic and autogenic relaxation or the results of the post-test week 3 showed a value of 97.47 mg/dl, which means that there was a clinically significant decrease, and was in accordance with the cut of point.

From Table 3, we also know that the p-value is 0.000 was obtained between the 1st-week post-test, 2nd week, and 3rd week of the intervention and control groups. It can be concluded that there is a significant difference between fasting blood sugar post-test weeks 1, 2, and week 3 of the intervention group and the control group. The average post-test stress level for the 3rd week in the prolanis gymnastic and autogenic relaxation intervention group was 13.07, which was an average level. Meanwhile, in the control group, the decline had yet to reach the normal level of 20.70 (moderate stress).

## DISCUSSION

The blood sugar results at week three after receiving nine times prolanis gymnastic and autogenic relaxation interventions have succeeded in achieving normal fasting blood sugar with a value range of 77-126 mg/dl (WHO normal GDP 126 mg /dl). This study found no significant difference between the fasting blood sugar values after week 1 of the intervention group and the control group with p-value = 0.7. However, weeks 2 and 3 of the intervention and control groups showed a significant difference with p = 0.000. The intervention was more effective in

reducing the respondents' fasting blood sugar to reach normoglycemic.

The clinical analysis of the significance of the intervention of prolanis gymnastic and autogenic relaxation on fasting blood sugar obtained an effect size of 1.92 (strong). The results of the analysis of the intervention of prolanis gymnastic and autogenic relaxation on fasting blood sugar were able to reduce fasting blood sugar. They had reached the cutoff point (< 126 mg/dl) after three weeks of administration, with a decrease of 107.167 mg/dl. In the intervention group, no respondents had fasting blood sugar >126 mg/dl, while in the control group, 21 respondents still had fasting blood sugar >126 mg/dl. The incidence of high blood sugar can be reduced by 100% from the previous incident, with the difference between the failure of the prolanis gymnastic intervention and autogenic relaxation in reducing GDP compared to the standard prolanis treatment at the puskesmas by 70%.

The results of this study confirm that the intervention of prolanis gymnastic and autogenic relaxation is effective in controlling and reducing fasting blood sugar levels in patients with type 2 diabetes mellitus. This increase in the body's need for oxygen will trigger the dilation of blood vessels in the muscles, improve blood circulation, increase insulin sensitivity in the muscles, and eventually will be able to control of blood sugar levels. At the same time, autogenic relaxation can stimulate the function of the islets of Langerhans in the pancreas to produce hormones. Glucagon-insulin works when it detects an increase in blood sugar. As well as regulating the adrenal glands to produce controlled cortisol hormones or also known as stress hormones in the body, when stress decreases, blood sugar levels in the body also decrease.<sup>12</sup>

The joint administration of prolanis gymnastic and autogenic relaxation maximizes the respondent's normoglycemic condition. prolanis gymnastic alone is considered not optimal in controlling blood sugar within normal limits because when doing prolanis gymnastic, the sensitivity of receptors in muscles increases, and glucose

uptake in muscles increases but is not accompanied by an increase in insulin produced by the pancreas. Autogenic is needed, which plays a role in stimulating the islets of Langerhans in the pancreas to produce insulin. Through mind-body therapy, autogenic relaxation will balance the conditions in the body with the environment. As a result, tensions in the body will decrease. A balanced body condition causes the blood supply to the pancreas to be smooth and produce insulin normally.<sup>13</sup>

Patients with type 2 diabetes mellitus will find it difficult to stabilize their blood sugar levels due to no psychological management, significantly reducing stress. Stress is a physiological and psychological condition of the body that can disturb and cause tension in the body and mind. Stress is the body's response to stressors that cause excess production of the hormone cortisol, where cortisol is a hormone that fights insulin work and causes high blood sugar levels.<sup>14</sup>

Previous studies explained that autogenic relaxation is needed, which is considered adequate for people with type 2 diabetes mellitus in stabilizing their stress levels and will work to provide a normal and balanced state in the body after giving prolanis gymnastic.

The results of the research conducted, it was found that there was a significant difference in the stress level of the respondents before and after being given treatment with prolanis gymnastic and autogenic relaxation as much as nine times the intervention ( $p = 0.000$ ) in the intervention group with the best average stress level of 13.07 (normal).

This study's results align with the results of Jablon et al., where Jablon suggests that exercise and relaxation can optimize physiological and psychological health as measured by a subjective questionnaire, namely, exercise and relaxation can produce a significant reduction in stress levels as measured by the DASS-42.<sup>15</sup>

The control group showed no significant difference in the stress level of the

respondents based on the pre-test - post-test difference test with  $p$ -value = 0.069. Most of the participants in the control group were still at moderate, severe, and mild stress levels after being given intervention according to the program at the puskesmas. This finding is in line with the results of Syafitri's research, namely, in the control group that was not given autogenic relaxation, the majority of respondents were at moderate and severe stress levels, and none of the respondents had normal stress levels.<sup>11</sup>

Psychological factors are one of the factors that play a role in increasing stress levels and blood sugar levels, so there is a need for psychological management in patients with type 2.<sup>96</sup> diabetes mellitus. So that the results of this study showed a decrease in the stress level of patients with type 2 diabetes mellitus after receiving prolanis gymnastic and autogenic relaxation. Prolanis gymnastic will increase the body's need for oxygen to trigger the dilation of blood vessels, improve circulation, and increase body hemodynamics, such as pulse rate.<sup>16</sup> Autogenic relaxation work regulates body systems, including reducing brain work so that heart rate becomes normal, normal blood pressure, and normal breathing frequency so that the body will return to a balanced and normal state. The mechanism is related to the activity of the HPA axis. The HPA axis regulates the hormone cortisol and the sympathetic nervous system, which controls heart rate, pulse, respiration, and blood pressure. The HPA response and the autonomic nervous system affect a person's performance in dealing with stress.<sup>17</sup>

Giving autogenic relaxation will suppress the anterior pituitary gland so as not to produce an adrenocorticotrophic hormone, stimulating the adrenal glands to produce cortisol. Emotional response to situations triggers the limbic system and changes in physiological signals in the peripheral and autonomic nervous systems that result in fighting stress. Relaxation mechanisms and self-suggestion can weaken psychoneuroimmunology, which affects the

stress response or suppresses excess cortisol secretion. If the release of cortisol is successfully suppressed, the stress level will not increase, and blood sugar levels in type 2 diabetes mellitus sufferers will be stable. Urbaningrum's research suggests that the higher a person's stress level, the higher his blood sugar level.<sup>18</sup> So prolanis gymnastic and autogenic relaxation effectively work hand in hand in reducing stress levels in people with type 2 diabetes mellitus.

Researchers did not control for several confounding variables, such as the diet and lifestyle of respondents, so it is feared that it could impact blood sugar levels even though research interventions have been given.

## CONCLUSIONS

This study concludes that prolanis gymnastic and autogenic relaxation three times a week for three weeks effectively reduce fasting blood sugar levels and stress levels in patients with type 2 diabetes mellitus. This study can be used for reference for future research, controlling the patient's diet, lifestyle, etc, and longer duration of intervention, so that the result obtained is more valid.

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