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Original Research

The Influence of Autogenic Relaxation in Lowering Stress and Blood Sugar Levels in Clients with Type II Diabetes Mellitus

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Abstract

Introduction: Stress is identified as one of the modifiable risk factors for diabetes mellitus. High stress levels can trigger an increase in blood sugar levels. There are four approaches to controlling blood sugar levels: pharmacological therapy, nutritional therapy, physical activity, and education on self-management of diabetes, such as implementing autogenic relaxation therapy. Autogenic relaxation is a form of mind-body intervention that originates from within an individual, involving short phrases or sentences that promote a sense of tranquility. The aim of this research is to examine the influence of autogenic relaxation in reducing stress levels in clients with Type II diabetes mellitus.
Methods: The research design employed iwas a quasi-experiment with a group control and pre-post-test. The intervention group received autogenic relaxation sessions lasting 15-20 minutes, six times with a one-day interval between sessions. The control group was observed without any intervention.
Results: The results revealed a significant difference between the intervention and control groups for the variables of stress (p-value 0.000) and blood sugar (p-value 0.008).
Conclusion: The analysis indicates that autogenic relaxation therapy can effectively reduce stress and blood sugar levels in Type II diabetes mellitus clients. We recommend that healthcare services implement autogenic relaxation therapy programs to assist clients with Type II diabetes mellitus in addressing stress-related issues and managing their blood sugar levels.

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INTRODUCTION

According to the World Health Organization (WHO) [1], diabetes is among the top 10 causes of death worldwide. In lower- to middle-income countries, diabetes has shifted from the 15th to the 9th rank as a cause of death, with the number of cases nearly doubling since 2000.

Indonesia ranks fifth with 19.47 million individuals affected by diabetes mellitus, with a total population of 179.72 million and a prevalence rate of 10.6% [2]. In West Java province [2], the prevalence of diabetes mellitus is 18.36%, equivalent to 186,809 individuals out of a weighted population of 1,017,290. In Bogor regency, there are 57,769 cases (6.8%), while Bogor city has 12,273 cases (1.4%) out of a weighted population of 848,455[3].

Two risk factors for type 2 diabetes are non-modifiable, including age, gender, and heredity, while modifiable risk factors encompass dietary patterns, physical activity, obesity, hypertension, smoking, stress, alcohol consumption, and others [4].

Stress is identified as a modifiable risk factor for diabetes mellitus. It is a nonspecific bodily response to disrupted needs, a universal phenomenon in daily life that cannot be avoided, impacting individuals physiologically, psychologically, intellectually, socially, and spiritually. High stress levels can trigger an increase in an individual's blood sugar levels, worsening the condition of diabetes mellitus [5].

Everyone experiences stress, but in diabetes, stress can exacerbate increases in blood sugar levels. A previous study by Rizky [7] found a significant relationship between stress and blood sugar levels in diabetic ulcer patients, with a p-value of 0.032 (α 0.05). Fifty-four percent of respondents with high-stress levels had elevated blood sugar levels. Thus, individuals with diabetes mellitus may experience stress.

There are four ways to control blood sugar levels: pharmacological therapy, nutritional therapy, physical activity, and self-management diabetes education. Regular therapeutic control is necessary to prevent complications in diabetes mellitus, and one method is self-management diabetes education, such as implementing autogenic relaxation therapy [8].

Silvia [9] defines autogenic relaxation as a technique with simpler instructional movements than other relaxation techniques, requiring only 15-20 minutes and adaptable to lying, sitting, or leaning positions. Another definition of autogenic relaxation is a mind-body intervention derived from within an individual, involving short phrases or sentences to create a tranquil mindset, using motivational phrases to envision a calm and peaceful state, focusing on heartbeat and breath regulation.

A previous study by Nurul Syafitri [10] analyzed 15 respondents experiencing work-related stress, with pretest results indicating 11 individuals with moderate stress and 4 with severe stress. After autogenic relaxation therapy intervention for those stressed due to workloads, post-test results showed a positive influence, with 11 individuals experiencing mild stress and 4 with moderate stress.

Based on the above description, the researcher is interested in investigating the "Influence of Autogenic Relaxation in Reducing Stress Levels and Blood Sugar in Clients with Type II Diabetes Mellitus." Autogenic relaxation is still relatively uncommon for individuals experiencing stress, particularly for those with type 2 diabetes.

METHODS

Study Design

The research design employed in this study was a Quasi-Experimental design with a control group, involving autogenic relaxation intervention.

Sampel and Population

The study population comprised type II Diabetes Mellitus (DM) patients in Bogor City. Samples were drawn from the working areas of Pasir Mulya Community Health Center (sub-districts Loji and Gunung Batu) and Gang Kelor (sub-districts Cilendek Timur RW 7 and 10) as the intervention group. The control group consisted of type II DM patients in the working area of Cakung Community Health Center, East Jakarta. The minimum sample size calculation, based on the results of hypothesis testing for the difference in two means with equal variance, a significance level of 5%, and a test power of 95%, yielded 58 individuals. The determined minimum sample size was 112 individuals for the total overall sample, with 56 individuals in each of the intervention and control groups.

Inclusion criteria for the sample were as follows: both male and female participants aged >18 years, diagnosed with type II Diabetes Mellitus with fasting blood sugar values between 140 - 400 mg/dl, experiencing mild (scores 20-24) to moderate (scores 25-29) stress levels, capable of concentration, effective communication, and willing to participate as respondents and receive the intervention. Exclusion criteria included patients refusing the intervention and those absent for a minimum of three out of eight meetings (screening, pre-post, intervention). The sampling method employed was random sampling to ensure all eligible respondents had an equal chance of being selected.

Instrument

The instruments used included questionnaires A, B, and C. Instrument A covered respondent demographic data, including respondent number, age, gender, highest education level, and occupation. Instrument B measured respondents' fasting blood sugar levels using a glucometer test, measured in mg/dl. Instrument C assessed stress using the Kessler Psychological Distress Scale questionnaire, which determined the stress levels of respondents. The Kessler Psychological Distress Scale comprised 10 questions presented to each respondent, with a score of 1 for responses indicating never experiencing stress, 2 for responses indicating rare stress experiences, 3 for responses indicating occasional stress experiences, and 4 for responses indicating frequent stress experiences.

Intervention Procedure

Preparation

The research involved lecturers and senior-level nursing students from the Nursing Program at the Bogor Health Polytechnic under the Ministry of Health Bandung, serving as enumerators and therapists. Training was conducted to align perceptions, knowledge, and skills regarding the research activities, questionnaire completion, fasting blood sugar examination, and autogenic relaxation procedures. The researcher prepared questionnaires, monitoring sheets, Standard Operating Procedures (SOP), autogenic relaxation video guides for therapists, and Voice-Notes as guides for respondents to perform autogenic relaxation independently.

Implementation

a. Intervention Group

Autogenic relaxation sessions were performed according to the SOP. On the first day, the therapist guided autogenic relaxation. Subsequently, the therapist provided Voice-Notes via WhatsApp as a guide for respondents to perform autogenic relaxation independently the following day.

Every three days, the therapist accompanied respondents during autogenic relaxation. The intervention was conducted for 15-20 minutes, twice a week, for two weeks. The therapist filled out a monitoring sheet for each respondent they accompanied. At the end of the study, stress levels and fasting blood sugar levels were measured.

b. Control Group:

At the beginning of the study, stress levels and fasting blood sugar levels were measured through Posbindu (Health Post at Community Hall) activities. After two weeks, stress levels and fasting blood sugar levels were measured again, followed by providing autogenic relaxation intervention as a reward.

Evaluation

The research results were reported to Pasir Mulya Community Health Center, Gang Kelora, and Cakung for further action, serving as feedback for the Non-Communicable Disease (NCD) program in other locations to assist type II DM clients in controlling their blood sugar levels.

Study Analyzed

This study used non-parametric statistical test cause the data distribution was not normal. The non-parametric Paired Sample T-test analysis using the Wilcoxon W method showed that in the control group. The end of study, a non-parametric statistical test was conducted using the independent T-test method with the Mann-Whitney U test to examine the difference in mean scores of stress and blood sugar between the intervention and control groups.

Ethical Clearance

The research had permission and ethical clearance from Health Research Ethics Committee with number 35/KEPK/EC/V/2023.

RESULTS

The implementation of autogenic relaxation therapy intervention in the control group was carried out for two weeks with six guided interventions and six independent interventions with voice note guidance through the respondents' or family members' WhatsApp numbers. Autogenic relaxation therapy was conducted by the researcher every two days, lasting for 10-15 minutes, following the autogenic relaxation therapy SOP. On days when the researcher was absent, respondents were advised to perform autogenic relaxation therapy with voice note guidance and monitored using a checklist form for the implementation of autogenic relaxation therapy.

During the intervention, some respondents could not complete the series of autogenic relaxation therapy activities comprehensively due to work-related and unavoidable reasons. Consequently, at the end of the study, we had 51 respondents in the intervention group and 51 respondents in the control group for further analysis.

To reduce the risk of bias in the research results, a homogeneity test was conducted on the characteristics of respondents in the intervention and control groups. The results, as shown in Table 1, indicate that almost all significance values are above 0.05, meaning there is no significant difference in respondent characteristics such as age, gender, education, occupation, stress, and fasting blood sugar between the Intervention and Control groups, except for gender (p-value=0.00), indicating a significant difference in gender between the intervention and control groups.

The table 2 shows that, at the beginning of the study, the average stress score in the intervention group was 23.57, and in the control group, it was 23.08. The average blood sugar level in the intervention group was 225, and in the control group, it was 221. To determine the statistical test to be used, a normality test was conducted on independent variables, with results showing significant values exceeding 0.05. This indicates that the data distribution for stress scores (p-value 0.00) and blood sugar (p-value=0.00) is not normal, failing the assumption for using parametric statistical tests. Consequently, further analysis employed non-parametric statistical tests.

During the research period, some respondents in the intervention group could not participate in autogenic relaxation activities six times due to reasons such as work commitments, medical needs, or traveling out of town. Therefore, at the end of the study, we analyzed 51 respondents in the intervention group and 51 respondents in the control group. Univariate analysis was conducted again to describe the characteristics of the respondents analyzed further in this study.

The table 3 indicates that in the intervention group, the average age of respondents was 61 years with a standard deviation of 9.4 years, ranging from 38 to 88 years old. In contrast, in the control group, the average age of respondents was 62 years with a standard deviation of 8.28 years, ranging from 43 to 82 years old. The average stress score in the intervention and control groups

was 23 with a standard deviation of 2.5. The fasting blood sugar level in the intervention group had an average of 225 mg/dl with a standard deviation of 76.80, and in the control group, it was 221 mg/dl with a standard deviation of 81.40.

From the table 4, it can be observed that the majority of respondents in the intervention group (78.4%) and control group (56.9%) were female, had an elementary school education (39.2% and 43.1%), and were not employed (92.2% and 80.4%).

In the intervention group of 51 respondents at the beginning of the study, the average stress score was 23.57 with a standard deviation of 2.808. At the end of the study, there was a decrease in the average stress score to 16.24 with a standard deviation of 4.798. Meanwhile, the fasting blood sugar of type II DM clients at the beginning of the study had an average of 225.04 mg/dl with a standard deviation of 76.808. This value decreased to 191.96 mg/dl at the end of the study, with a standard deviation of 78.054.

The results of the non-parametric statistical test using the Wilcoxon test, as shown in Table 5 indicate a significant difference in mean scores before and after the intervention in the intervention group for both stress scores (p-value 0.000) and blood sugar scores (p-value 0.001). This implies that autogenic relaxation has an impact on stress and blood sugar levels in type II DM clients. Autogenic relaxation can effectively reduce stress and blood sugar levels in type II DM clients.

Table 6 shows that, among the 51 respondents in the control group at the beginning of the study, the average stress score was 23.08 with a standard deviation of 2.508. At the end of the study, there was an increase in the average stress score to 24.51 with a standard deviation of 2.810. Meanwhile, the fasting blood sugar level of Type II DM clients at the beginning of the study had an average of 221.22 mg/dl with a standard deviation of 81.404, and at the end of the study, it increased to 230.45 mg/dl with a standard deviation of 79.281.

The non-parametric Paired Sample T-test analysis using the Wilcoxon W method showed that in the control group, there was a significant difference in the average stress score (pre-post) (p-value 0.000) and the average blood sugar level (pre-post) also showed a significant difference (p-value 0.00). This means there is a significant difference in stress scores (p-value = 0.00) and blood sugar levels (p-value = 0.00) before and after autogenic relaxation therapy (increase). The study results in the control group suggest that without autogenic relaxation therapy, both stress and blood sugar levels have been proven to increase.

At the end of the study, a non-parametric statistical test was conducted using the independent T-test method with the Mann-Whitney U test to examine the difference in mean scores of stress and blood sugar between the intervention and control groups. As seen in Table 7 the p-value is 0.000 for the stress variable and 0.008 for the blood sugar variable. This indicates a significant difference between the intervention and control groups for both stress and blood sugar

variables. It can be analyzed that autogenic relaxation therapy can reduce stress and blood sugar levels in clients with Type II diabetes.

Table 1

Homogeneity Test Results Characteristics of respondents based on age, gender, education, work, stress and blood sugar in the intervention group (n=51) and control (n=51)

Variable	Group	Med	SD	sig
Age	Intervention	61,43	9,426	0,752
	Control	62,82	8,282	
Gender	Intervention	1,78	0,415	0,00
	Control	1,57	0,500	
Education	Intervention	2,04	0,999	0,202
	Control	1,82	0,842	
Job	Intervention	3,84	0,579	0,193
	Control	3,75	0,595	
Stress Score	Intervention	23,57	2,809	0,094
	Control	23,08	2,505	
Blood Sugar	Intervention	225,04	76,808	0,801
	Control	221,22	81,404	

Table 2

Results of Normality Test Data for Stress Scores and Fasting Blood Sugar in the Intervention Group (n=51) and Control (n-51) with the Kolmogorov Smirnov Test

Variable	Group	Mean	Median	Modus	sig
Stress	Intervention (Pre)	23,57	15	14	0,000
	Control (Pre)	23,08	23	23	
Blood Sugar	Intervention (Pre)	225	200	300	0,000
	Control (Pre)	221	197	130	

Table 3

Characteristics of respondents in the intervention group (n=51) and control (n=51) based on age, stress score and fasting blood sugar

Group	Characteristic	Mean	SD	Min-Max
Intervention	Age	61	9,4	38 – 88
	Stress score	23	2,5	20 – 29
	Fasting Blood Sugar	225	76,80	112 – 400
Control	Age	62	8,28	43 – 82
	Stress Score	23	2,50	20 – 29
	Fasting Blood Sugar	221	81,40	127 – 400

Table 4

Characteristics of respondents in the intervention group (n=51) and control (n=51) based on gender, education and employment

Group	Characteristic	Amount	Percentage (%)
Intervention	Gender:	51	100
	Male	11	21,6
	Female	40	78,4
	Education :	51	100
	Elementary	20	39,2
	Junior High School	13	25,5
	Senior High School	14	27,5
	Bachelor S1/S2	4	7,8
	Job :	51	100
	Work	4	7,8
	Not Work	47	92,2
Control	Gender:	51	100
	Male	22	43,1
	Female	29	56,9
	Education :	51	100
	Elementary	22	43,1
	Junior High School	17	33,3
	Senior High School	11	21,6
	Bachelor S1/S2	1	2,0
	Job :	51	100
	Work	10	19,6
	Not Work	41	80,4

Table 5

Differences in Mean Stress Scores and Fasting Blood Sugar (pre -post) in the Intervention Group (n=51)

Variable	Measurement	Mean	SD	sig
Stress score	Pre -test	23,57	2,808	0,000
	Post Test	16,24	4,798	
Fasting Blood Sugar	Pre -test	225,04	76,808	0,001
	Post Test	191,96	78,054	

Table 6

Differences in Mean Stress Score and Fasting Blood Sugar (pre – post) in Control Groups (n=51)

Variable	Measurement	Mean	SD	sig
Stress score	Pre -test	23,08	2,508	0,00
	Post Test	24,51	2,810	
Fasting Blood Sugar	Pre -test	221,22	81,404	0,00
	Post Test	230,45	79,281	

Table 7

Differences in Mean Stress Scores and Fasting Blood Sugar in the Intervention Group (n=51) and Control (n=51) at the End of the Study

Variable	Groups	Mean Rank	Sum of Ranks	sig
Stress score	Intervention	30,09	1.543,50	0,000
	Control	72,91	3.718,50	
Fasting Blood Sugar	Intervention	43,77	2.232,50	0,008
	Control	59,23	3.020.50	

DISCUSSION

Autogenic Relaxation

Autogenic relaxation is one of the choices for relaxation therapy that focuses on self, using short positive words, and can be done in a lying or sitting position [12]. With suggestive word guidance from the therapist, autogenic relaxation leads the mind towards a more positive direction [13]. Autogenic relaxation can be performed in a calm and comfortable environment, either individually or in a group. The goals of autogenic relaxation include making oneself more comfortable, reducing physical and psychological tension such as stress. In this study, autogenic relaxation was conducted for one week, every day. On the first day, clients underwent autogenic relaxation with guidance from us, and then we provided clients with a recording of the autogenic relaxation process in the form of a voice note via WhatsApp as a guide for independent autogenic relaxation. On the third day, we assisted and evaluated the independent practice of autogenic relaxation, providing feedback for improvement in subsequent sessions, and so on until the sixth day.

At the beginning and end of the autogenic relaxation sessions, we measured the stress and blood sugar levels of selected DM clients based on predefined inclusion criteria. Stress was measured using the Kessler Psychological Distress Scale, consisting of ten questions with five answer choices. Blood sugar measurement was performed in a fasting condition of at least eight hours using a glucometer with peripheral blood samples. The measurement results before and after autogenic relaxation were analysed and compared to assess the difference in values before and after autogenic relaxation.

We included a control group that did not receive autogenic relaxation intervention for comparison. The control group received health services through integrated health posts (posyandu), including health examinations and consultations according to Posyandu service standards. Stress and blood sugar measurements were also conducted for the control group at the beginning and end of the month. Statistical analysis was then performed to determine the differences in stress and blood sugar levels in Type II DM clients between the control and intervention groups.

Stress Level

Clients with Type II DM often experience physical and psychological issues such as stress and fear of death [14]. Our initial data collection indicated that the magnitude of stress issues in DM clients was 51% (128 out of 247 individuals). Subsequently, DM clients experiencing stress (mild and moderate) were randomly divided into two groups: the intervention group and the control group. The intervention group received guided and independent autogenic relaxation exercises for six sessions. Initially involving 64 Type II DM clients, some clients could not continue the sessions due to work commitments, more urgent matters, and so on. Hence, at the end of the activity, data from 51 individuals were available for further analysis.

Among the 51 respondents, at the beginning of the intervention, the average stress score was 23.57 with a standard deviation of 2.808, and at the end of the study, there was a decrease in the average stress score to 16.24 with a standard deviation of 4.798. Autogenic relaxation statistically proved its ability to reduce stress in the intervention group (p-value 0.000). During autogenic relaxation, DM clients were guided to self-attribution, starting by feeling tension and gradually relaxing until they felt relief [15]. Our research findings align with Nurul's (2018) study, demonstrating the impact of autogenic relaxation on stress [10]. Regular autogenic relaxation can provide comfort, reduce muscle tension, and alleviate stress. Autogenic relaxation, as an intervention, can be performed individually and focused on determining factors [16].

In the control group, out of 51 respondents at the beginning of the study, the average stress score was 23.08 with a standard deviation of 2.508, and at the end of the study, there was an increase in the average stress score to 24.51 with a standard deviation of 2.810. The analysis showed a significant difference in stress scores (p-value = 0.00) before and after autogenic relaxation (increase). This indicates that without autogenic relaxation therapy, stress in Type II DM clients has been proven to increase. Our research results support Izzati's (2015) statement that the majority (62.5%) of DM clients experience stress [17].

At the end of the study, statistical tests were conducted to observe the difference in average stress scores between the intervention and control groups. The analysis provided insight that stress in both the intervention and control groups showed a significant difference (p-value 0.000), meaning autogenic relaxation therapy can reduce stress in Type II DM clients. Most Type II DM clients, whether male or female, experience irritability or mood swings [18], and autogenic relaxation therapy has a positive effect on their mental condition [19]. Our findings support Hasanah's (2019) assertion that autogenic relaxation can be one of the options to address stress [20] because it is a promising therapy to enhance the psychological well-being and quality of life of Type II DM clients [21].

Blood Sugar

At the beginning of the study, the average fasting blood sugar level in the intervention

group was 225.04 mg/dl, then at the end of the study, it decreased to 191.96 mg/dl. Statistical tests showed that the comparison of mean blood sugar levels before and after intervention in the intervention group had a significant difference (p-value 0.001). This means that autogenic relaxation has an impact on the blood sugar levels of Type II DM clients. Autogenic relaxation can lower blood sugar levels in Type II DM clients. Our research findings reinforce Rizki's (2020) statement that there is a significant difference in blood sugar levels before and after autogenic relaxation [7].

In the control group, at the beginning of the study, the average fasting blood sugar level in Type II DM clients was 221.22 mg/dl with a standard deviation of 81.404, and at the end of the study, it increased to 230.45 mg/dl with a standard deviation of 79.281. The analysis showed a significant difference in the mean blood sugar levels (pre-post) in the control group (p-value 0.00). This means that there is a significant difference in blood sugar levels (p-value = 0.00) before and after autogenic relaxation (increase). The research results in the control group indicate that without autogenic relaxation therapy, the blood sugar levels of Type II DM clients have been proven to increase. In the course of Diabetes Mellitus, various complications such as hypertension can occur [22]. To prevent complications in DM clients, blood sugar control needs to be carried out through various relaxation therapies, one of which is autogenic relaxation [8]. Autogenic relaxation can be an option for Type II DM clients experiencing stress, helping to control their blood sugar levels and reduce the risk of complications threatening healthy aging and prognosis [23].

The comparison of mean blood sugar levels in the intervention and control groups shows a difference. The average blood sugar level in the intervention group decreased, while in the control group, it increased. This reinforces Saputra's[6] statement that there is a relationship between stress and blood sugar levels in Type II DM patients. In the intervention group, where stress decreased, blood sugar levels decreased. With the ability to control their blood sugar, Type II DM clients can avoid microvascular complications.

NURSING IMPLICATION

Autogenic relaxation therapy can be utilized as a complementary therapy by nurses in treating patients with type II diabetes. The administration of autogenic relaxation therapy can assist in managing patient stress and has an impact on maintaining controlled blood sugar levels. Therefore, this therapy is quite effective as a complementary approach by nurses in providing nursing care for diabetic patients.

LIMITATION

The number of study samples became 51 respondents for each group due to some samples being unable to participate in the intervention process fully. As a result, they were excluded from the intervention group. The researcher also couldn't control factors such as patients having to leave the city during the study, patients being in good health and not hospitalized, and patients being unable to attend during the administration of

the therapy intervention.

CONCLUSION

There is a significant difference between the intervention and control groups for both stress and blood sugar variables. It can be analyzed that autogenic relaxation therapy can reduce stress and blood sugar levels in clients with Type II diabetes.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this research and article publication.

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