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THE EFFECT OF PROGRESSIVE MUSCLE RELAXATION ON REDUCING STRESS AND BLOOD SUGAR IN TYPE 2 DIABETES MELLITUS PATIENTS IN THE WORK AREA OF TANIWEL PUBLIC HEALTH CENTER

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Abstract

The main problems that often occur in people with Diabetes Mellitus (DM) are stress and an increase in blood sugar. Uncontrolled stress for a long time can lead to an increase in blood sugar levels, which can lead to various complications. One of the physical activities that can be done with relaxation is Progressive Muscle Relaxation (PMR) is an intervention that can be done in people with diabetes. The purpose of the study was to determine the effect of Progressive Muscle Relaxation (PMR) on increasing stress and blood sugar levels. The research design used a quasi-experimental approach with a pre-post-test control group design approach. The sample consisted of 36 respondents who were divided into 18 intervention groups and 18 control groups. The group was given a therapeutic intervention for 1 week with a duration of 2 times a day, namely in the morning and afternoon for 10-15 minutes. The instruments used are a glucometer, blood sugar level observation sheet, and Diabetes Distress Scale (DDS) questionnaire. Data analysis used the Wilcoxon test and Paired t-test to see pair data. Then for the research group, the data used the Man-Whitney Test. The results showed that there was a significant effect on decreasing blood pressure (p=0.013) and that there was an effect on decreasing blood sugar levels (p=0.034). Conclusion: Progressive Muscle Relaxation (PMR) affects reducing stress and blood sugar levels in Type 2 DM patients.

Keywords: *Progressive Muscle Relaxation (PMR), Diabetes Mellitus (DM), Stress, Blood Sugar Level.*

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PRELIMINARY

Type 2 diabetes mellitus is a global health problem because the prevalence and incidence of this disease continue to increase, both in industrialized and developing countries, including Indonesia. Type 2 Diabetes Mellitus is a growing epidemic, resulting in tremendous individual suffering and economic loss (Decroli, 2019). a disease characterized by high blood sugar levels, the body does not have insulin or insulin does not work properly (IDF, 2019). Diabetes Mellitus is a metabolic disease in which the body cannot control glucose due to insulin deficiency. In Type 2 Diabetes Mellitus, the pancreas has enough insulin to metabolize glucose, but the body cannot use it efficiently, as production decreases and glucose levels increase [(1)]. Progressive Muscle Relaxation is relaxation therapy by tightening and relaxing the muscles in one part of the body at a time to provide physical relaxation. Movement of muscles and relaxation progressively in this group is done sequentially. When performing the PMR, observe the patient is directed to distinguish the feelings experienced when the muscle group is relaxed and compared to when the muscles are tense [(2)].

The International Diabetes Federation (IDF) organization estimates that at least 436 million people aged 20-70 years in the world suffer from diabetes in 2019 or equivalent to a prevalence rate of 9.3% of the total population at the same age. If classified by gender, IDF estimates the prevalence of Diabetes in 2019 is 9% in women and 9.65% in men. The prevalence of diabetes is expected to increase as the population ages 19.9% or 111.2 million people aged 65-79 years. Predicted numbers continue to increase to reach 578 million in 2030 and 700 million in 2045 [(3)]. The incidence of diabetes in Indonesia is still high, according to the 2018 Rikesdas data, with a prevalence of 11.3%. Indonesia is ranked 7th among 10 countries with the highest number of sufferers, namely 10.7 million people. Indonesia is the only country in Southeast Asia that is on the list of 10 countries with the highest number of people with diabetes in the world, so it can be estimated that Indonesia's largest contribution to the prevalence of diabetes cases in Southeast Asia [(4)].

Based on the results of basic health research (Riskesdas) Almost all provinces showed an increase in prevalence in 2013-2018, except for the Province of East Nusa Tenggara (NTT). There are 4 provinces with the highest prevalence in 2013 and 2018, namely DI Yogyakarta, North Sulawesi, DKI Jakarta, and East Kalimantan. There are several provinces with the highest prevalence increase of 0.9%, namely Riau, DKI Jakarta, Banten, Gorontalo, and West Papua. And East Nusa Tenggara Province has the lowest prevalence of 0.9%, followed by Maluku and Papua at 1.1% [(5)].

Diabetes Mellitus prevalence based on doctor's diagnosis in residents of all ages by district/city in all Maluku Provinces, Riskesdas 2018, the highest Diabetes Mellitus prevalence rate is found in Ambon City Regency as much as 1.38% and for West Seram Regency the order is 0.47% [(6)]. Based on data from the Health Office (Dinkes) of West Seram Regency in 2018 cases of Diabetes Mellitus were 37.4%, then in 2019, the number of cases remained the same at 37.4%, while in 2020 there was a decrease of 25.9% [(7)].

The results of a preliminary study conducted by researchers at the Taniwel Health Center, West Seram Regency with Type 2 Diabetes Mellitus in the Taniwel Health Center Work Area in 2018 were 247 cases (40.9%) and in 2019 it remained the same, namely 247 cases (40.9%). %), then for 2020, there were 73 cases (12.3%), while for January-May 2021 there were 36 cases (5.9%) suffering from type 2 Diabetes

Mellitus. Based on interviews with several type 2 Diabetes Mellitus sufferers who obtained several complaints about controlling blood sugar, it triggers stress or frustration from type 2 Diabetes Mellitus sufferers in controlling blood sugar. Several things have been done such as maintaining the diet but it is very difficult to maintain the diet. So that it triggers stress which results in unstable blood sugar. This proves that stress affects the patient's blood sugar levels.

Emotional stress can hurt diabetes control. In addition to having an impact on increasing blood sugar levels, when stress occurs, people with diabetes can change their diet, exercise, and use drugs that are usually adhered to. This situation can cause hyperglycemia or even hypoglycemia [8]. This is in line with the research of Mitra (2008) that stress can increase the adrenaline hormone which can convert glycogen in the liver into glucose and increase blood sugar in DM patients and the occurrence of complications of Diabetes Mellitus. Stress can also increase appetite and make people hungry, especially in foods rich in carbohydrates and fats [9]. Based on the above background, it is necessary to research the effect of progressive muscle relaxation on reducing blood sugar and stress in patients with type 2 Diabetes Mellitus.

RESEARCH METHODS

The design of this study used a Quasi Experiment with a pre-post control group design approach. In both groups, starting with the pre-test and after giving the award for the post-test re-measurement [10]. The sample is 36 respondents so it uses a ratio of 1:1. Which was divided into 18 intervention groups and 18 control groups. The group was given a therapeutic intervention for 1 week with a duration of 2 times a day, namely in the morning and evening for 10-15 minutes. The sampling technique was carried out using a total sampling technique. This research was conducted on 13 August-13 October 2021. Instruments using the *DDS Questionnaire (Diabetes Distress Scale)* to see the level of stress and glucometer, blood sugar stick, needle (blood lancet), alcohol swab, clean hands cold, and blood sugar observation sheet to see the increase in blood sugar. The instrument used to measure the action was using the PMR observation sheet according to the guidelines made by the researcher during the study and the results of measuring blood sugar before and after the PMR intervention. Data analysis used the Wilcoxon test and Paired t-test to see pair data. Then for the research group, the data used the Man-Whitney Test.

RESULT

1. Univariate Analysis

Table 1. Distribution of Frequency by Age of Respondents.

Age	(n)	%
35-44	6	16.7
45-54	6	16.7
55-64	16	44.4
65-74	8	22.2
Total	36	100

Source: Primary Data 2021

Table 1 shows that the highest age distribution of respondents is in the Taniwel Health Center Work Area, 44.4% and the lowest is 16.7%.

Table 2. Frequency Distribution by Gender of Respondents

Gender	(n)	%
Male	14	38.9
Female	22	61.1
Total	36	100

Source: Primary Data 2021

Table 2 shows that the sex distribution of the highest respondents was in the Taniwel Health Center Work Area, with 61.1% female and the lowest male 38.9%.

Table 3 Distribution of Frequency Based on Respondents' Education

Education	(n)	%
Primary School	14	39.9
Junior High School	10	27.8
Senior High School	6	16.7
College tall	6	16.7
	36	100

Source: Primary Data 2021

Table 3 shows that the distribution of the highest respondent's education level is in the Taniwel Health Center Work Area, which is Elementary School Level 39.9% and the lowest is SMA and College at 16.7%.

Bivariate Analysis

Table 4. Frequency Distribution of Respondents Based on Stress Levels in Types of Diabetes Mellitus Patients in the Work Area of the Taniwel Care Community Health Center

Stress Level	Treatment		Control	
	(f)	%	(f)	%
Light	4	22.2	6	33.3
Currently	9	50.0	10	55.6
Tall	5	27.8	2	11.1
Total	**18**	**100%**	**18**	**50%**

Source: Primary Data 2021

Table 4 shows that the proportion of respondents with the highest type of Diabetes Mellitus stress level in the treatment group was 9 people with a percentage of 50.0% and the highest control group was 10 people with a percentage of 55.6%.

Table 5. Frequency Distribution of Respondents based on Stress Levels in Type 2 Diabetes Mellitus Patients Before doing Progressive Muscle Relaxation (PMR) in the Work Area

Taniwel Health Center

Category	Treatment		Control	
	(n)	%	(n)	%
Bad	12	61.2	10	55.6
Currently	6	38.9	7	38.9
Well	0	0	1	5.6
Total	**18**	**100 %**	**18**	**100%**

Source: Primary Data 2021

Table 5 shows that the stress level of the respondents before being given Progressive Muscle Relaxation (PMR) exercise with a bad category in the treatment group was 12 people with a percentage of 61.2% and the control group was 10 people with a proportion of 55.6%. while the good category in the control group is 0% and in the control group is 1%.

Table 6. Frequency Distribution of Respondents Based on Stress Levels in Type 2 Diabetes Mellitus Patients After Performing Progressive Muscle Relaxation (PMR) in Working Area of Taniwel Health Center

Stress Level	**Treatment**		**Control**	
	(f)	%	(f)	%
Light	11	61.1	6	33.3
Currently	4	22.2	10	55.6
Tall	3	16.7	2	11.1
Total	**18**	**100 %**	**18**	**100%**

Source: Primary Data 2021

Table 6 shows that the stress level of respondents with type 2 Diabetes Mellitus after doing Progressive Muscle Relaxation (PMR) exercises in the control group was mild with 11 people with a proportion of 61.1% and 6 people in the control group with a proportion of 33.3%.

Table 7. Frequency Distribution of Respondent's Blood Sugar Levels in Type 2 Diabetes Mellitus Patients After Performing Progressive Muscle Relaxation (PMR) in Working Area of the Taniwel Nursing Health Center

Category	**Treatment**		**Control**	
	(f)	%	(f)	%
Bad	6	38.9	10	55.6
Currently	12	61.1	7	38.9
Well	0	0	1	5.6
Total	**18**	**100 %**	**18**	**100%**

Source: Primary Data 2021

Table 7 shows that the frequency distribution of blood sugar levels of respondents with type 2 Diabetes Mellitus with a high percentage, namely the medium category in the control group, is 12 people with a percentage of 61.1% and 10 people with a proportion of 55.6% in the control group.

Table 8. Effect of Progressive Muscle Relaxation on Stress Levels Type 2 DM patients

Group		Mean	SD	Min	Max	*p-value*	*Man Whitney Test*
Treatment	*Pre*	47.17	15.554	29	79		
	Post	33.89	11.198	22	55	*p=0.000*	
							P=0.013
Control	*Pre*	45.56	12.021	30	73		
	Post	44.39	10.370	30	65	*p=0.444*	

Source: Primary Data 2021

Table 8 shows that the Effect of Progressive Muscle (PMR) in the treatment group with a p-value = 0.00 and in the control group is p = 0.444 and the value of the Man Whitney statistical test is 0.013.

Table 9. Tabulation of the Effect of Progressive Muscle Relaxation (PMR) on Reducing Blood Sugar Levels in Type 2 Diabetes Mellitus Patients in the Work Area of the Taniwel Health Center

Group							*Man Whitney test*
KGD		Mean	SD	Min	Max	*P value*	
Treatment	*Pre*	143. 61	27.049	111	200	*p=0.000*	
	Post	125. 67	23.213	101	180		*P=0.034*
Control	*Pre*	144. 00	25.481	98	192	*p=0.158*	
	Post	143. 39	24.534	99	190		

Source: Primary Data 2021

Table 9 shows that the tabulated value in the treatment group is a p-value of 0.000 and in the control group is p = 0.158 and the Man Whitney statistical test is p = 0.034.

DISCUSSION

1. **The stress level in patients with Type 2 Diabetes Mellitus before doing Progressive Muscle Relaxation**
   The results of the study based on the Diabetes Distress Scale (DDS) questionnaire found by the researchers showed that before doing Progressive Muscle Relaxation (PMR) therapy in the treatment group, most of the respondents experienced moderate stress levels with a total of 9 respondents (50.0%) and a small proportion of respondents. experiencing stress levels. mild stress as many as 4 respondents (22.2%) and in the control group most of the respondents experienced moderate stress levels as many as 10 respondents (55.6%) and a small portion experienced high levels of stress as many as 2 respondents (11.1%).
   After making observations using the *Diabetes Distress Scale (DDS) questionnaire* before carrying out Progressive Muscle Relaxation (PMR) it was found that the signs of stress experienced by respondents were mostly caused by frequent fear and difficulty when dealing with diabetes, frequent lack of confidence, and long-term complications and the occurrence of diabetes. an increase in blood sugar levels which causes the respondent to be disturbed in their daily activities [(11)].

2. **Stress level before doing Progressive Muscle Relaxation in Diabetes Mellitus Type 2 patients**
   The results of the study based on the Diabetes Distress Scale (DDS) questionnaire showed that after doing Progressive Muscle Relaxation (PMR) therapy, researchers found that there was an influence on stress so that in the treatment group most of the respondents experienced mild stress levels with a total of 11 respondents (61.1%) and a small proportion of respondents experienced high levels of stress as many as 3 respondents (16.7%) and in the control group most of the respondents experienced moderate levels of stress with 10 respondents and a small portion experienced high levels of stress with 2 respondents (11.1%). The results obtained from this study indicate that the stress level in the treatment group has decreased.
   Over time the Progressive Muscle Relaxation (PMR) intervention has been completed with a duration of 10-15 minutes for one week 2 times a day, in the morning and evening. The results obtained after doing PMR there are significant changes so it can be said that PMR can reduce stress levels in Type 2 Diabetes Mellitus Patients [(12), (13)].

3. **Blood sugar levels before doing Progressive Muscle Relaxation in Type 2 Diabetes Mellitus patients**
   Results Based on the research, it was found that before doing Progressive Muscle Relation (PMR) most of the respondents had poor blood sugar levels in the treatment group with a total of 12 respondents (61.2%) in the control group and 10 respondents (55.6%) and a small proportion had moderate blood sugar levels, 6 respondents (38.9%) in the treatment group and good, namely 1 respondent (5.6%) in the control group.

Before doing Progressive Muscle Relaxation, researchers observed blood sugar levels using a glucometer and observation sheet. Observation of blood sugar levels in the morning before the respondent consumes food so that there are no factors that interfere with the respondent's fasting blood sugar level. At the time of observation of blood sugar levels, most of them were categorized as having poor blood sugar levels or more than 126 models.

4. **Blood sugar levels after doing Progressive Muscle Relaxation in Type 2 Diabetes Mellitus patients**

   Based on the results of the study, it was found that before doing Progressive Muscle Recovery (PMR) most of the respondents had moderate blood sugar levels in the treatment group with a total of 12 respondents (61.1%) and a small proportion who had poor blood sugar levels 6 respondents (38.9%), then in the control group it is known that most of the respondents have bad blood sugar levels, namely 9 respondents (50.0%) and a small proportion who have good blood sugar levels, namely 1 respondent (5.6%).

   After performing Progressive Muscle Relaxation for 1 minute consecutively, then for the control group, there was no significant change in the treatment group, while in the control group there was no significant change. These results were seen after observing the respondents' blood sugar levels after 1 week of PMR therapy.

5. **Effect of Progressive Muscle Relaxation (PMR) on the stress level of Type 2 Diabetes Mellitus patients**

   Results Based on statistical tests, it is known that there is a significant change in stress levels in type 2 Diabetes Mellitus patients. The results of this study were processed and analyzed using the Wilcoxon sign rank test. The results showed that the progressive muscle relaxation intervention in type 2 DM patients resulted in a significant decrease in stress levels (P = 0.000) in the treatment group and the control group got a significant decrease in stress (P = 0.000). 0.444). From these data, in the treatment group, there was a decrease in stress before and before being given progressive muscle relaxation intervention in type 2 DM patients. The results of the Mann-Whitney Test showed that there was a significant difference in the score (p = 0.013) between the treatment group and the control group.

6. **Effect of Progressive Muscle Relaxation (PMR) on reducing blood sugar levels in Type 2 Diabetes Mellitus patients**

   Results Based on statistical tests, it was found that there was a significant change in the decrease in blood sugar levels in patients with type 2 Diabetes Mellitus. control 10 respondents (55.6%) and a small proportion who have moderate blood sugar levels, 6 respondents (38.9%) in the control group.

   The post-test results after being given a progressive muscle relaxation intervention, in the treatment group, most of the respondents had moderate blood sugar levels in the treatment group with a total of 12 respondents (61.1%) and a small proportion who had poor blood sugar levels 6 respondents (38, 9%),

in the control group, it was known that most of the respondents had bad blood sugar levels, namely, 9 respondents (50.0%) and a small proportion had blood sugar levels, 1 respondent (5.6%).

The results of the researcher's analysis showed that there was a decrease in blood glucose levels after progressive muscle relaxation (PMR). This means that progressive muscle relaxation (PMR) is one of the therapies given to patients with diabetes mellitus to lower blood glucose levels [(14), (15), (16)].

CONCLUSION

1. Type 2 DM patients in the treatment group had an average stress level of 47.17 before progressive muscle relaxation, while in the control group before treatment, the average was 45.56.
2. In type 2 DM patients in the treatment group before the intervention, the average stress level was obtained with a score of 33.89. While in the control group before the intervention, the average score was 44.39.
3. Type 2 DM patients in the intervention group had blood sugar levels with an average of 143.62 mg/dl before Progressive muscle relaxation and in the control group before receiving treatment an average of 144 mg/dl.
4. In patients with type 2 DM in the treatment group before the intervention, the average blood sugar level with a score of 125.6 mg/dl was obtained. and in the control group before treatment obtained an average of 143.39 mg/dl.
5. PMR significantly reduces stress in type 2 DM patients. This is indicated by p = 0.013 which means that there is a significant difference in scores between the treatment group and the control group. PMR exercise performed 2 times a day for 3 consecutive days caused a decrease in stress from moderate to mild levels. PMR affects blood sugar reduction in type 2 DM patients significantly which causes a decrease in blood sugar from poor to moderate levels. This is indicated by p = 0.034 which means that there is a significant difference in scores between the treatment group and the control group.

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