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THE EFFECTIVENESS OF PROGRESSIVE MUSCLE RELAXATION ON BLOOD SUGAR LEVELS OF TYPE 2 DIABETES MELLITUS PATIENTS

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Abstract

During the pandemic diabetes itself becomes the most dangerous comorbid because diabetes increases the risk of more severe complications when infected with the Corona virus. people with diabetes mellitus do not carry out one of the pillars to stabilize blood sugar levels, namely physical activity. The purpose of this study was to determine the effectiveness of progressive muscle relaxation on blood sugar levels in patients with type 2 diabetes mellitus (T2DM). The design of this study was quasi-experimental with the type of pretest and posttest intervention. The research population was 36 people and the sample was taken using simple random sampling, each with 18 people. The research instrument used an observation sheet and a glucometer to measure blood sugar levels. Data analysis using the Wilcoxon sign rank test with the result <0.05. The results showed that the results of blood sugar levels before and after Progressive muscle relaxation in the treatment group had a P-value = 0.016, P-value <0.05, the hypothesis was accepted that progressive muscle relaxation was effective in reducing blood sugar levels in patients with T2DM. Future studies are expected to compare other complementary therapies to stabilize blood sugar levels in patients with T2DM.

Keywords: *Progressive Muscle Relaxation; Type 2 Diabetes Mellitus; Blood Sugar Levels*

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1. Introduction

In Indonesia, most cases of type 2 diabetes mellitus (T2DM) are caused by an unhealthy lifestyle and lack of physical activity which causes impaired glucose metabolism to be converted into energy. This is because glucose in the blood cannot be put into cells, because insulin is reduced in number, or cells are resistant to insulin. So that the amount of glucose in the blood continues to increase (Bistara, et al., 2019). During the pandemic diabetes itself became the most dangerous comorbid because diabetes increased the risk of more severe complications when infected with the Corona virus. With restrictions on activities outside the home during the pandemic, inevitably many people have to do all activities at home, but precisely because of this, many people are neglectful of lifestyle management which ends up running a sententary life. Thus, people with diabetes mellitus do not carry out one of the pillars to stabilize blood sugar levels, namely physical activity. In addition, many diabetics do not know that controlling blood sugar levels can be done in a non-pharmacological way, for example with relaxation techniques (Putriani, 2018). Most people with Diabetes Mellitus never apply this management because they are considered to have no function.

During the pandemic, the prevalence of diabetic patients in Indonesia increased to 6.2%, which means that there are more than 10.8 million people suffering from diabetes per year 2020. Indonesia is ranked 7th out of 10 countries with the highest number of sufferers, which is 10, 7 million people. The Southeast Asian region, which Indonesia is included in, ranks third with a prevalence of diabetes sufferers of 11.3%. According to the Ministry of Health of the Republic of Indonesia (2020), Indonesia is the only country in Southeast Asia that is included in the list, so it can be estimated that Indonesia's contribution to the prevalence of diabetes in Southeast Asia can be estimated. The results of the 2018 Riskesdas show that the prevalence of diabetes mellitus in Indonesia based on a doctor's diagnosis in the population aged 15 years is 2% (Bistara and Rusdianingseh, 2019). According to the results of Riskesdas in 2018, the

prevalence of diabetes mellitus in East Java province based on a doctor's diagnosis in residents of all ages reached 2.02%, in the Surabaya city area it showed a prevalence of 4.43% (Riskesdas, 2018), and from the results of a preliminary study conducted On October 13, 2021, in the girlfriend area of RW 10, it was found that from 12 respondents who were interviewed by researchers stated that they had never done physical exercise either by means of progressive muscle relaxation.

Diabetes mellitus is mostly caused by insulin resistance. Insulin resistance is a condition that indicates that the body is no longer able to respond to insulin as it should. Generally, this occurs in people who are overweight or obese. The hormone insulin is needed to help glucose enter the body's cells to be broken down into energy. When the body is no longer sensitive to insulin action, glucose cannot enter the body's cells to be broken down into energy so that it eventually stays in the bloodstream, resulting in high blood sugar levels (Cai *et al.*, 2021). It is important for people with Diabetes Mellitus to comply with a series of checks such as controlling blood sugar. If compliance in controlling blood sugar in people with diabetes mellitus is low, it can cause uncontrolled blood sugar levels which will cause complications. Adhering to blood sugar control is a big challenge so that there are no subjective complaints that lead to complications. Diabetes mellitus if not handled properly, it can lead to various kinds of complications. There are two complications in Diabetes Mellitus, namely acute complications and chronic complications. Chronic complications consist of macrovascular complications and microvascular complications. Coronary heart disease, cerebral vascular disease, and peripheral vascular disease are types of macrovascular complications, retinopathy, nephropathy, and neuropathy are types of microvascular complications. Retinopathy is the disruption of the retina of the eye resulting in partial or permanent blindness. Diabetic nephropathy is a complication that occurs in patients with diabetes in the kidneys who have the ultimate risk of kidney failure (Lathifah, 2017).

Management of diabetes mellitus is the management or planning of treatment of a disease which is divided into two, namely pharmacology and non-pharmacological therapy. The first step that must be taken for the management of diabetes mellitus is non-pharmacological management, in the form of meal planning and physical activity. After these steps the predetermined diabetes control target has not been achieved, proceed with the following steps, namely the use of drugs or pharmacology (Susanti and Bistara, 2018). Non-pharmacological therapy is one of the complementary alternative therapies and methods used to restore the health of sick people by giving pleasure, both physically and mentally and achieve healing. There are several non-pharmacological therapies, namely aerobic exercise, progressive relaxation, deep breathing exercises, hypnosis, music relaxation, and aromatherapy. Progressive muscle relaxation is one way of stress management activities given to patients to help someone relax, increase calm, reduce anxiety, stress or anger. The method applied in this progressive relaxation technique is gradual and continuous practice (Putriani, 2018).

Therefore, researchers are interested in conducting a study entitled "The Effectiveness of Progressive Muscle Relaxation and Lemon Aromatherapy on Blood Sugar Levels in Patients with Type 2 Diabetes" as a non-pharmacological measure to control/reduce the increase in blood sugar that can be done independently at home by diabetes mellitus.

2. Method

The research method used is quasi-experimental with the type of pretest and posttest intervention. This research was carried out from December 2021 to January 2022 in the Boyfriend area, RW 10, Paddyling Village, Tambaksari Subdistrict with a sample of 36 people and sampling using simple random sampling with criteria for DM patients without complications and DM patients who were routinely controlled by dividing each group as many as 18 respondents. The research instrument is an observation sheet and a glucometer for measuring blood sugar levels. Data analysis using the Wilcoxon sign rank test with the result <0.05.

Research ethics is a research procedure with professional, legal, and social responsibilities for research subjects. In addition to ethical principles, the researcher also provided information to the respondents before the research was conducted. The researcher contacted the respondent to provide an explanation about the research. The explanations given include research objectives, research procedures, research benefits, risks and inconveniences that will be caused, maintaining data confidentiality, compensation if unexpected things happen, and the responsibility of the researcher. The researcher then asked for willingness to participate in the study. Researchers collected primary data and asked respondents to sign an informed consent. After confirming the completeness of all the data, then the data will be processed and analyzed according to the research objectives.

3. Results and discussion

General Data

Table 1 shows that in the area of RW 07, Paddyling Sub-district, Tambaksari Sub-district, Surabaya, most of the treatment groups and the control obtained the most are female sex as many as 13 people (72%) and 14 people (78%) people. The

results of the age distribution of Diabetes Millitus respondents in RW 07, Paddyling Subdistrict, Tambaksari Subdistrict, Surabaya, obtained the most from each group was the treatment group, namely age > 60 years as many as 12 people (67%), the average of these respondents had the last high school education, namely 10 people (56%). Meanwhile, based on the routine characteristics of taking medication from the treatment and intervention groups, 13 people (72%) and 10 people (56%). The results of the survey on the health aspect of respondents, in the area of RW 07, Paddyling Subdistrict, Tambaksari Subdistrict, Surabaya with the characteristics of long suffering from Diabetes Millitus obtained from the treatment group, namely > 5 years as many as 13 people (72%) and the control group dominated by < 5 years 14 people (74%).

Table 1. Distribution of Respondents' Characteristics in the RW 07 area of Paddykeling Village, Tambaksari Sub-district, Surabaya December 2021-January 2022 (N=36 respondents)

Source of Data on	Respondents Characteristics			
	Treatment		Group Control Group	
	Total	Percentage	Total	Percentage
Characteristics of sex				
Male	5	28	4	22
Female	13	72	14	78
Total	18	100	18	100
Age characteristics				
<40 years old	1	6	4	22
age 50-60 years	5	28	6	34
age >60 years	12	66	8	44
Total	18	100	18	100
Last education				
Elementary School	0	0	1	6
Junior High School	5	28	7	38
Senior High School	8	44	10	56
College	5	28	0	0
Total	18	100	18	100
Routine taking medication				
Routine	5	28	8	44
Not drinking	13	72	10	56
Total	18	100	18	100
Length of suffering				
> 5 Years	13	72	4	22
< 5 Years	5	28	14	78
Total	18	100	18	100

Table 2. Characteristics of Respondents Based on Blood Sugar Levels in the Treatment Group and Control Group in December 2021-January 2022

Blood Sugar Level Research				
Treatment Group	Before Intervention		After Intervention	
	Total	Percentage	Total	Percentage
Normal	4	22	13	72
Hypoglycemia	0	0	0	0
Hyperglycemia	14	78	5	28
Total	18	100	18	100
Control Group	Before Intervention		After Intervention	
	Total	Percentage	Total	Percentage
Normal	2	11	7	39
Hypoglycemia	0	0	0	0
Hyperglycemia	16	89	11	61
Total	18	100	18	100

	Post Test - Pre Test
Wilcoxon Signed Ranks Test	-2.419[b]
Based on positive ranks.	0.016

Table 2 Shows the results of the characteristics of the blood sugar levels of respondents in RW 07, Paddyling Subdistrict, Tambaksari Subdistrict, Surabaya in the treatment group. blood sugar levels in the normal category 13 people (72%), after being given intervention in the Progressive Muscle Relaxation treatment group respondents showed a decrease in blood sugar levels to 13 people (72%). In the control group, based on respondent's data from

The results showed that after Progressive Muscle Relaxation was carried out 2 weeks 1 day a day, the researchers measured blood sugar levels to respondents after being given the intervention. 4 people (22%), after being given the intervention became 13 people (72%), in the hypoglycemia category there were no respondents with that category, and the hyperglycemia category (>200 mg/dL) which was originally 14 people (89%) after being given the intervention became 5 people (28%). The characteristics of respondents based on age showed that the majority of respondents with diabetes mellitus aged >60 years amounted to 12 people (67%). Characteristics of respondents based on gender showed that most of the respondents were female, amounting to 13 people (72%). Characteristics of respondents based on education level where most of the respondents have a high school education level amounting to 8 people (44%). Characteristics of respondents based on the routine of taking medication where most of the respondents regularly took diabetes medication, namely 13 people (72%). Characteristics of respondents based on the duration of suffering from diabetes mellitus where most of the respondents suffered from diabetes mellitus for more than 5 years, namely 13 people (72%).

Risk factors that affect diabetes mellitus are age, age is a risk factor for the occurrence of diabetes mellitus. The higher the age, the risk of developing diabetes mellitus will also increase. According to Rochman, the older the age group the incidence of DM increases. In the elderly will experience impaired glucose tolerance. Increased blood glucose levels in patients with increasing age due to insulin resistance due to changes in body composition, decreased activity, changes in diet and decreased neurohormonal function (Bellary *et al.*, 2021). Another risk factor that affects diabetes mellitus is gender, the incidence of diabetes mellitus is higher in women than men. According to Taylor, this is caused by decreased levels of the hormone estrogen due to menopause. Estrogen basically functions to balance blood sugar levels and increase fat storage, as well as progesterone which functions to normalize blood sugar levels and help use fat as energy. The normal, there was an increase in respondents who experienced hyperglycemia as many as 11 people (61%). From the statistical test results show that the results of blood sugar levels before and after Progressive OOT Relaxation in the treatment group has a P value = .016, P value <0.05, the hypothesis is accepted that progressive muscle relaxation is effective in lowering blood sugar levels in patients. type 2 diabetes mellitus.

hormone estrogen functions to respond to insulin. After menopause, changes in estrogen hormone levels will trigger fluctuations in blood glucose levels, this causes a higher incidence of DM in women than men (Taylor, 2008). Another risk factor that affects diabetes mellitus is the level of education, the level of education can affect a person's ability, knowledge and behavior in implementing healthy living behaviors, especially in controlling blood sugar levels (Majid, et al., 2019). Another risk factor that affects diabetes mellitus is the regularity of taking medication, the results of the study obtained, for the average value of sugar levels in respondents who regularly take anti-diabetic drugs, the number and percentage are higher than respondents who do not regularly take Anti-Diabetes Drugs (OAD), Regularity of taking medication is thought to have an effect on decreasing blood sugar levels. As with research (Liang *et al.*, 2021), that DM patients in terms of blood glucose levels, have a significant difference between obedient and non-adherent patients in taking Oral Hypoglycemic Drugs (OHO) and their blood sugar levels. Another risk factor that affects diabetes mellitus is length of suffering, people with diabetes mellitus who suffer from illness for longer have a lot of experience, get more information about how to control blood sugar so that it can be applied in life. Progressive Muscle Relaxation aims to reduce blood sugar levels, this exercise will relax the body. The parasympathetic system will stimulate the hypothalamus to decrease the secretion of corticotropin releasing hormone (CRH). A decrease in CRH will affect the secretion of adrenocorticotropic hormone (ACTH). This situation can inhibit the adrenal cortex to release the hormone cortisol. The decrease in the hormone cortisol will inhibit the process of gluconeogenesis and increase the use of glucose by cells, so that blood sugar levels return to normal limits (Putriani, 2018).

Based on the description of the facts and theories above, the researcher argues that respondents who have normal blood sugar levels have an average of high school education, regularly take medication and suffer from diabetes mellitus for more than 5 years. Researchers argue that knowledge is an important factor for the formation of an action.

The longer the patient has DM, the more information he will get so that the information becomes knowledge that can be applied in everyday life.

4. Conclusion

Giving progressive muscle relaxation therapy can reduce blood sugar levels in people with diabetes mellitus effectively.

5. Suggestions

Respondents are expected to provide solutions and benefits for the community, especially respondents to add information, knowledge, and skills in managing DM which includes diet management, activity or exercise management, checking blood sugar levels more regularly and complying with pharmacological therapy.

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