
The Effect Of Progressive Muscle Relaxation Exercise And Diaphragmatic Breath On Quality Of Life In Diabetes Mellitus Patients

Sukma Wicaturatmashudi^{1*}, Ismar Agustin², Prahardian Putri³
^{1,2,3}Nursing Study Program, Palembang Health Polytechnic, South Sumatra, Indonesia

*Corresponding Author

Email : sukma@poltekkespalembang.co.id

Abstract

Diabetes Mellitus is a metabolic disease that has an impact on almost all organ systems of the body. The risk of complications and the long treatment period and even a lifetime is one of the triggers for the worsening quality of life. This study aims to determine the effect of a combination of progressive muscle relaxation exercises and diaphragmatic breathing exercises on the quality of life in Diabetes Mellitus patients at Siti Khadijah Islamic Hospital Palembang. The design of this study was a quasi-experimental pre post test with control group. The population in this study were all patients with diabetes mellitus at the Siti Khadijah Islamic Hospital in Palembang. Data analysis was performed with univariate and bivariate. Bivariate analysis using t test dependent and independent t test. The results showed that there was a significant difference in the mean quality of life before and after the treatment of progressive muscle relaxation exercise and diaphragmatic breathing exercise (p value = 0.014) and there was a significant effect of progressive muscle relaxation exercise and diaphragmatic breathing exercise on the quality of life value (p value = 0.005). Based on the results of the study, it is recommended to implement progressive muscle relaxation exercises and diaphragmatic breathing exercises in patients with Diabetes Mellitus on a regular and continuous basis

Keywords: *Progressive Muscle Relaxation Exercise, Diaphragmatic Breathing Exercise, Quality Of Life.*

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease characterized by high blood sugar levels due to decreased insulin secretion. The impact of chronic hyperglycemia in DM patients is always related to long-term damage and failure of body organs, especially the eyes, kidneys, nervous system, heart and blood vessels. (American Diabetes Association, 2012).

Based on data from the American Diabetes Association (2012), long-term complications of DM include the risk of vision loss, nephropathy that progresses to kidney failure, peripheral neuropathy with the risk of foot ulcers, amputations and Charcot joints. In addition, DM patients have a high incidence of atherosclerotic, peripheral arterial and cerebrovascular disease. In 2000 worldwide the prevalence of Diabetes Mellitus (DM) reached 171 million people. This figure is predicted to increase to 366 million in 2030. Of this figure, it is estimated that 90% are type II DM..

The National Institute of Diabetes and Digestive and Kidney Disease estimates that 16 million Americans are known to have diabetes, and millions of them are at risk for developing diabetes. Of all diabetics, 15% suffer from foot ulcers, and 12-14% of those with foot ulcers require amputation. More than half of nontraumatic amputations are the result of complications of diabetic ulcers, and are associated with high rates of mortality, reamputation and amputation of the contralateral leg. Even after good wound healing outcomes, the recurrence rate is estimated to be around 66%, and the risk of amputation increases to 12%. This will trigger the patient's psychological imbalance both acutely and long term. Stress and deteriorating quality of life are serious problems in DM patients who experience complications.

The prevalence of diabetes is increasing rapidly in the world, especially in low- and middle-income countries and in 2015 it is estimated that globally, nearly 415 million people living with diabetes (Ogurtsova et al., 2017). Type 2 diabetes accounts for 90% of cases. The increasing prevalence and incidence of type 2 diabetes, coupled with its costly complications, burden health

services. It is estimated that about 12% of global health spending is dedicated to the Health-related costs of the condition (Ogurtsova et al., 2017). In the UK, the cost of type 2 diabetes to the NHS has been estimated at around 10% of the NHS budget (£8.8 billion), of which around 80% (£7.7 billion) is spent on complications related (Celik et al., 2020)(Liu et al., 2010).

The increase in the incidence of type 2 diabetes mellitus will also be followed by an increase in the incidence of complications. Complications experienced by patients vary, including physical, psychological, social and economic complications. Physical complications that arise in the form of eye damage, kidney damage, heart disease, high blood pressure, stroke and even gangrene. Diabetes can also affect the quality of life of the sufferer, such as psychological health, physical function, and social roles. Quality of life is one of the main criteria for determining health care interventions such as morbidity, mortality, fertility and disability (Meidikayanti & Wahyuni, 2017).

Changes in the quality of life of patients with Type II Diabetes Mellitus require both pharmacological and non-pharmacological interventions. One of the non-pharmacological interventions is progressive muscle relaxation exercises and diaphragmatic breathing exercises. Progressive muscle relaxation is a relaxation technique that is simple and easy to do independently both during treatment and at home (Shinde et al., 2013). Based on the research conducted by researchers, the combination intervention between PMR and diaphragmatic breathing exercises has never been carried out. Another study which is a combination of PMR treatment with music and aromatherapy has been shown to have a significant effect in reducing stress levels in the teaching community (Dewi, 2019).

Deep relaxation techniques will result in an immediate reduction in stress and anxiety. The main substance of this relaxation technique is a conscious control process by stretching which is then followed by a decrease in muscle tension towards relaxation. When the body is aware of the tension in a group of muscles, it triggers the muscle to relax, where the rest of the other components of the relaxation response naturally follow. (Russo et al., 2017).

Progressive muscle relaxation is a behavioral therapy that aims to relieve psychological and physical symptoms by relaxing muscles with repeated tension and relaxation. PMR has been shown in several studies to activate the parasympathetic nervous system, lower heart rate and blood pressure and reduce physiological tension. PMR is commonly used to manage several syndromes such as anxiety migraine in circulatory disease patients, 25 and chemotherapy-induced nausea and vomiting (Kwak et al., 2020).

However, the research conducted by Wicaturatmashudi et al stated that there was no significant effect of ROP treatment on the blood pressure of type 2 DM respondents at Siti Khadijah Hospital, Palembang. (Wicaturatmashudi et al., 2019) and also there is no significant effect of progressive muscle relaxation exercises on the stress of Diabetes Mellitus patients (Sukma Wicaturatmashudi, Azwaldi Erman, 2020)

RESEARCH METHODS

The design used in this study was a quasi-experimental which was divided into 2 sample groups, namely the experimental and control groups. The experimental group was given treatment with progressive muscle relaxation exercises and diaphragmatic breathing exercises while the control group was not given any treatment. The population in this study were all patients with type II diabetes mellitus who were hospitalized at Siti Khadijah Hospital in Palembang and during treatment at home and at the Internal Medicine Polyclinic. The inclusion criteria for the sample were willing to be a respondent, not having musculoskeletal disorders that interfered with treatment, composmentis awareness and the distance between the house and the hospital was still within the scope of the study. The sampling technique was done by purposive sampling. The sample was divided into 2 research groups. Each group consists of 21 respondents. The treatment group was

given progressive muscle relaxation exercises and diaphragmatic breathing while the control group was not given any treatment. The treatment was given 2 times a day for 6 days. Data collection was carried out before treatment and at the end of treatment on day 6. Data analysis was carried out univariate and bivariate with dependent t test and Mann Whitney. The study was conducted after obtaining ethical approval from the Health Research Ethics Commission of the Makassar Health Polytechnic Number : 1048/KEPK-PTKMKS/IX.

RESULTS AND DISCUSSION

Table 1
 Distribution gender and ulcer incidence

Variable	Intervention (n =21)		Control (n=21)		P value
	f	%	f	%	
Gender					
Male	5	23.8	6	29.6	1.000
Female	16	76.2	15	71.4	
Incidence of Ulcer					
Ulcer	6	23.8	5	23.8	1.000
No Ulcer	15	76.2	16	76.2	

The results showed that female respondents had more numbers than men in both the treatment and control groups. Based on the table above shows that most of the respondents did not have ulcer complications in both the treatment and control groups, namely 76.2%.

Table 2
 Distribution of Blood Sugar Levels and Quality of Life

Variable	Groups	Mean	Median	SD	Min-Max	95%CI	P value
Blood Sugar level	Intervention	201.86	206	73.84	90 - 340	168.24–235.47	0.775
	Control	206.33	180	97.23	120 - 588	162.07– 250.59	
Intervention							
	Before	99.39	101	13.61	57-121	93.19-105.57	0.001
	After	108.67	111	10.95	81-127	103.68-113.65	
Quality of Life							
Control							
	Before	94.67	98	13.84	57-111	88.37-100.96	0.014
	After	100.05	101	9.90	71-111	95.54-104.55	

The results showed that the average blood sugar level of the respondents was 201.86 mg/dl in the treatment group and 206.33 in the control group. The lowest blood sugar level in the treatment group was 90 mg/dl, lower than the group, which was 120 mg/dl. The highest blood sugar level was actually experienced by the group, namely 588 mg/dl while the treatment group was 340 mg/dl.

Table 2 also shows that the average value of quality of life is the same both before and after the treatment of progressive muscle relaxation exercises and diaphragmatic breathing. The results found in the group. The highest quality of life value was found in respondents after being given treatment with progressive muscle relaxation exercises and diaphragmatic breathing, which was 127.

Table 3
 Effect of progressive muscle relaxation exercises and diaphragmatic breathing exercises on quality of life

Variable	Group	Mean	SD	p – value
Quality of Life	Intervention (n = 21)	108.67	10.95	0.005
	Control (n = 21)	100.05	9.90	

The table of research results shows that there is a significant effect of progressive muscle relaxation exercise and diaphragmatic breathing on quality of life, indicated by a p value of 0.005 through the Mann Whitney test..

Discussion

The results showed that there were more female respondents than male respondents in both the treatment and control groups. Women tend to be obese in men. Obesity has a tendency to the metabolic syndrome and a high risk of developing type II diabetes. The results of the study are in line with the research conducted (Irvan & Maritha, 2016) where more women, namely 68.3% who suffer from DM.

The results also illustrate that the respondents in the treatment group and most of them did not have ulcers. Ulcer is one of the complications of Diabetes Mellitus that can trigger stress and decrease quality of life. Ulcers can occur in DM patients who have experienced neuropathy which is then exacerbated by high blood sugar levels and low patient compliance in controlling blood sugar. Patients with diabetes mellitus have 29 times the risk of complications of diabetic ulcers. Diabetic ulcers are open sores on the skin surface caused by macroangiopathy, resulting in vascular insufficiency and neuropathy. Diabetic ulcers are easy to develop into infections due to the entry of germs or bacteria and the presence of high blood sugar becomes a strategic place for the growth of germs. Diabetic ulcers if they do not get treatment and care immediately, it will be easy for an infection to spread and in more advanced circumstances require amputation. Diabetic ulcers are the most feared and upsetting chronic complication for DM patients, both in terms of length of treatment, high costs required for treatment that costs 3 times more than without ulcers..

Judging from the results of research on blood sugar levels in the treatment group, the average was quite high, namely 201.86 mg/dl. Meanwhile, when viewed from the lowest value is 90 mg/dl and the highest is 340 mg/dl. DM patients tend to find it difficult to control their blood sugar levels considering that compliance is very important. The three main pillars in controlling blood sugar are taking medication or insulin regularly, sticking to the diet and the patient must regularly move. Respondents, in this case DM patients, when their blood sugar levels have started to normal, then again ignore compliance with the three main pillars.

While the results of the study illustrate that the average value of the quality of life of respondents in the group that received treatment with progressive muscle relaxation exercises and diaphragmatic breathing exercises was 108.67. While in the treatment group, the highest quality of life score was 127. Quality of life is an indicator of individuals enjoying their lives from various

aspects of their lives. A high quality of life determines the level of individual well-being in his life. Patients with chronic diseases such as DM have a tendency to decrease their quality of life. DM patients, especially those with complications of microangiopathy and macroangiopathy, find it difficult to develop their adaptability to stressful situations. Meanwhile, when viewed before and after the PMR and DB exercises, there was a significant difference in the respondents' mean quality of life. The mean value of quality of life increased significantly after treatment. Although in the control group who did not receive treatment, there was also a difference in the mean value of quality of life after being assessed on the 6th day. DM is a metabolic disorder disease, especially insulin hormone which has a tendency to become a chronic condition. The risk of experiencing complications is very high considering that controlling blood sugar levels requires a level of patient compliance. While compliance is a factor that requires support from other factors outside the patient's internal motivation.

The results showed that there was a significant effect of PMR and DB exercise on increasing the value of quality of life after being compared to the control group who did not receive treatment (p value 0.005). The results of the study are supported by the opinion of Richmond (2007) which states that the main principle of PMR exercise is to give tension to one muscle group and then relax it and the patient will feel a relaxed feeling when the effect changes. This relaxation technique has been widely used in various health conditions of patients and has a positive effect. This is reinforced when ROP exercises are combined with diaphragmatic breathing exercises. DB exercise causes a calm response that is modulated by the parasympathetic nervous system. Diaphragmatic breathing increases heart rate variability, which is a measure of the balance of sympathetic and parasympathetic influences. This has a positive effect on several conditions such as post-MI, ischemic heart disease, CHF, and diabetes with autonomic neuropathy (Kulur et al, 2009). The combination of these two interventions will synergistically improve the quality of life of DM patients.

Progressive muscle relaxation will block this pathway by activating the work of the parasympathetic nervous system and manipulating the hypothalamus through concentration of thoughts to strengthen positive attitudes, so that the impulse pressure on the hypothalamus is reduced. According to Jacobson explained that progressive muscle relaxation is a response to tensions that cause changes in the control of autonomic nervous activity in the form of decreased function of oxygen, respiration, pulse, muscle tension, blood pressure and alpha waves. According to Dunning, complementary therapy to benefit patients with DM can improve the current state of acceptance, reduce stress, anxiety, depression, develop sustainable strategies to prevent stress. He also explained that the benefits of progressive muscle relaxation improve metabolic control, lower blood sugar, reduce catecholamines and autonomic nervous activity. After relaxation the patient will feel a relaxed and comfortable condition, progressive relaxation can make the body and mind become calm and relaxed. Relaxation increases the secretion of endorphins and decreases the secretion of adrenal hormones, in addition to increasing blood circulation, and reducing stress and anxiety caused by the emergence of a positive attitude due to improved brain function. Next, we will control the balance of blood sugar and blood pressure (Avianti et al., 2016)

CONCLUSION

There is a difference in the value of quality of life before and after the treatment of progressive muscle relaxation exercises and diaphragmatic breathing (p value = 0.014). There is a significant effect of progressive muscle relaxation exercise and diaphragmatic breathing on the respondent's quality of life (p value = 0.005)

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