



The Effect of Prolanis Exercise Activities on Decreasing Blood Sugar Levels in Diabetes Mellitus Patients

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Article Info

Article history:

Received 27 January 2021

Received in revised form 12

February 2021 Accepted 24

February 2021

Keywords:

Elderly Gymnastics

Blood Sugar Le

Abstract

Diabetes exercises are physical exercises designed according to age and physical status and are part of the treatment of diabetes mellitus. When a person does physical exercise in the muscles of the body, the heart system and blood circulation and breathing are activated. Therefore, the body's metabolism, fluid and electrolyte balance and acid base must adjust. Muscles will use free fatty acids and glucose as a source of energy or energy. When physical exercise begins glucose originating from muscle-muscle glycogen when physical exercise starts being used as a source of energy. Assessing the effect of the implementation of prolanis exercise activities on reducing blood sugar levels in patients with Type 2 Diabetes Mellitus in Puskesmas Padangmatinggi in 2019. This type of research is quantitative with a quasi-experimental design that designs using one group pretest-posttest, when this study was conducted in January-April year 2020. The population in this study were all patients with diabetes mellitus who follow prolanis gymnastics in Padangmatinggipuskesmas with purposive sampling technique, namely the determination of the sample by specifying specific characteristics consisting of 15 intervention / experimental groups and 15 control groups 15 people The results showed that there was an effect of the application of prolanic exercise activities to reduce blood sugar levels in patients with type 2 diabetes at Padangmatingi Public Health Center in Padangsidimpuan with a P-Value of 0.007, and there were differences in blood sugar levels in the intervention and control groups with a P. Value of 0,000.

Introduction

Increasing the degree of public health is health development which is included in the national development section, in this case the government through Sustainable Development Goals (SDGs) carries out sustainable development as a new global development agenda which is an indicator of achieving overall health development in accordance with the SDGs goals as an effort to achieve indicators. Increase in the degree of good health, namely reducing by one third of deaths from non-communicable diseases Non-communicable diseases are the largest contributor to mortality in the world, especially in developing countries, diabetes militus is the main disease with a death rate reaching 1.6 million at the age of 20 - 70 years.

According to data from WHO, the number of DM around the world is around 230 million people and this figure will increase by 3% or as much as 7 million every year. In the coming 2025, there are 350 million people with diabetes. DM has become the fourth largest death factor

in the world. Every year there will be around 3.2 million deaths caused by DM. Diabetes mellitus can be grouped into 2 categories, namely type I diabetes mellitus, namely DM caused by decreased tissue sensitivity to the effects of insulin or often called insulin resistance, type 2 diabetes mellitus is caused because a person is overweight. Type 2 diabetes will have various effects on the entire body, including loss of blood glucose in urine, dehydration, tissue damage, increased use of fat, metabolic acidosis and protein loss (Donnan & Segar, 2019; Chaudhury et al., 2017). According to the management of diabetes mellitus patients, it consists of 5 main pillars, namely education, nutritional therapy, physical, pharmacological and monitoring. Physical activity is one of the pillars of implementing DM, based on this information, it can be concluded that one of the solutions to lowering blood sugar levels is to do sports such as prolanic exercise. One of the benefits of prolanis exercise is to prevent obesity by burning calories in the body so that blood glucose can be used for energy.

Education with the aim of promoting healthy living needs to always be done as part of prevention efforts and is a very important part of the holistic management of Diabetes Mellitus. Educational materials consist of early level educational materials and advanced educational materials (Indonesia, (2015)). Patients with Diabetes Mellitus need to be given emphasis on the importance of regular meal schedules, types and amounts of calorie content, especially for those who use drugs that increase insulin secretion or insulin therapy itself (Indonesia, 2015). Physical exercise is one of the pillars in the management of DMT2 if it is not accompanied by nephropathy. Daily physical activities and physical exercise are carried out regularly 3-5 times per week for about 30-45 minutes, for a total of 150 minutes per week. The break between workouts is not more than 2 consecutive days. It is advisable to check blood glucose before physical exercise. If the blood glucose level is $<100\text{mg} / \text{dL}$ the patient must consume carbohydrates first and if $> 250\text{mg} / \text{dL}$ it is advisable to postpone physical exercise. Daily activities or daily activities are not included in physical exercise although it is recommended to be active every day. Physical exercise in addition to maintaining fitness can also lose weight and improve insulin sensitivity, which will improve blood glucose control (Indonesia, 2015).

Blood sugar levels are the amount of glucose found in blood plasma (Dorland, 2010). Monitoring blood sugar levels is needed in establishing a diagnosis, especially for diabetes mellitus, blood sugar levels can be checked when the patient is fasting or when the patient comes to check, with the results of the examination, the blood glucose level is $> 200\text{mg} / \text{dl}$, meanwhile for the results of fasting glucose levels $> 126 \text{ mg} / \text{dl}$ (Waspadji, 2011). Blood glucose is a term that refers to glucose levels in the blood whose concentration is strictly regulated by the body. The glucose flowed through the direction is the main source of energy for the body's cells. Generally, glucose levels in the blood remain in the range of $4\text{-}8 \text{ mmol} / \text{L} / \text{day}$ ($70\text{-}150 \text{ mg} / \text{dl}$), these levels increase after meals and are usually at their lowest levels in the morning before people consume food.

BPJS has organized programs for people with DM type II, since 2014, including exercise, health education, KGD examinations and discussions between health workers and Prolanis participants. Whereas at the Padangmatinggi puskesmas, this program was started in 2015, this program aims to encourage participants with chronic diseases to achieve optimal quality of life with an indicator that 75% of registered participants who visit first-level health facilities have "good" results on specific examinations of Type II DM so that can prevent complications.

Based on the initial survey conducted at the Padangmatinggi community health center in 2018, data on diabetes mellitus sufferers who received treatment were 564 out of 12,900 (4.37%) visits, and in 2019 as many as 589 out of 12,100 (4.86%), temporary visits to registered with diabetes mellitus in the period January to March 2019 as many as 65 patients. The results of interviews conducted by researchers with nurses holding the DM program at the Padangmatinggi community health center have carried out exercise every morning once a week and blood sugar checks once a month. In addition, at the Puskesmas Padangmatinggi, a research

has never been carried out entitled "the effect of the application of prolanic exercise on reducing blood sugar levels in patients with type 2 diabetes".

Methods

This research is a quantitative type with a quasi-experimental design whose design uses one group pretest-posttest, because this study aims to compare the results of the two group intervention, namely the intervention group and the control group, both of which were measured before and after the intervention. This research was conducted in the working area of the UPTD Puskesmas Padangmatinggi, Padangsidempuan City, with an area of 843.06 Ha. Addressed at Jl. Imam Bonjol is behind the Padangmatinggi Inpres market, which consists of 8 urban villages and 39 neighborhoods, namely Wek V Village, Aek Tampang Village, Silandit Village, Padangmatinggi Village, Padangmatinggi Lestari Urban Village, Losung Village, Sitamiang Village, New Seitamiang Village. The reason the researchers took this place as the research area was because in the Padangmatinggi community health clinic there had never been any research on the effect of prolans exercise on reducing blood sugar levels in type 2 diabetes patients. as many as 30 people from January - April 2020. Where the number is determined by the BPJS. The sample type of this research is Porbality sampling using purposive sampling technique, namely determining the sample by determining specific characteristics, which are in accordance with the research objectives so that it is expected to be able to answer the research problem. Involve participants who suffer from type 2 diabetes who meet the inclusion and exclusion criteria. In this study, the subjects or respondents were divided into 2 groups, namely the type 2 DM group who participated in prolanic exercise (intervention group) as many as 15 people and the control group, namely the type 2 DM group who did not participate in the prolanic exercise as many as 15 people.

Prolanic exercise is carried out starting from warm-up movements (1 and 2), core movements (1 and 2) and cooling movements (1 and 2). This prolanic exercise is done 4 times a month or once a week for 30-45 minutes. Blood sugar levels were measured using the Accu-Check glucose before and after applying the Prolanis exercise. Preparation before the test was carried out one day before the study. Where research subjects should be well rested, not to do tiring physical activity and not to consume foods high in carbohydrates.

Result and Discussion

Table 1. Distribution of Respondents Based on Characteristics in the Treatment and Control Groups at the Padangmatinggi Community Health Center

Characteristics	Group					
	Treatment		Control		Total	
	n	%	N	%	N	%
Sex						
Male	8	53.3	5	33.3	13	43.3
Female	7	46.7	10	66.7	17	56.6
Age						
36-45 years	5	33.3	2	13.3	7	23.3
46-55 years	5	33.3	6	40.0	11	36.6
56-65 years	2	13.3	7	46.7	9	0.3
>65 years	3	20.0	0	0	3	10
Pendidikan						
Elemntary School	0	0	0	0	0	0
Junior School	0	0	0	0	0	0
High School	8	20.0	2	13.3	10	33.3

Diploma/Bachelor or	7	80.0	13	86.7	20	66.7
Employment						
House Wife	0	0	0	0	0	0
Private employees	0	0	0	0	0	0
Civil Servant	12	66.7	12	80.0	24	80
Labor/farmer	0	0	0	0	0	0
Retirement	3	33.3	3	20.0	6	20
Total	15		15		30	

Based on the frequency distribution of sex in the experimental group with type 2 diabetes mellitus in the Padangmatinggi community health center, Padangsidempuan city, 15 respondents, the majority of which were women, were 8 people (53.3%) and the minority were 7 people (46.7%).

Table 2. Frequency Distribution of Blood Sugar Levels

KGD	N	Mean	Median	SD	Min	Max	95 % CI
Group							
Pre Intervension	15	186.00	185.00	24.437	150	230	172.47-199.53
Pre Control	15	150.31	152.50	24.730	110	185	137.13-163.49
Post Intervension	15	160.33	160.00	19.316	120	195	149.64-171.03
Post Control	15	127.33	130.00	14.864	100	155	119.10-135.57

Based on the results of the above research, it can be concluded that in the pre-intervention / experimental group before doing Prolanic exercise is 186.00, with a standard deviation of 24.437, a minimum value of 150 and a maximum of 230 with a 95% confidence level, the average blood sugar level before doing Prolanic exercise is between 172.47-199.53

The pre-control group before doing Prolanic exercise was 150.31 with a standard deviation of 24,730, a minimum value of 110 and a maximum of 185 with a 95% confidence level, the average blood sugar level between 137.13-163.49.

The pre-intervention / experimental group after doing prolanic exercise was 160.33 with a standard deviation of 19,316, a minimum value of 120 and a maximum of 195 with a 95% confidence level, the average blood sugar level before doing prolanic exercise, which was between 149.64-171.03

The pre-control group after doing Prolanic exercise was 127.33 with a standard deviation of 14,864, a minimum value of 100 and a maximum of 155 with a 95% confidence level, the average blood sugar level between 119.10-135.57

Table 3. Data Normality Test

Variable	Group	N	Sig
Blood Sugar Levels	Pre Experiment	15	0.200
	Pre Control	15	0.200
	Post Experimen	15	0.200
	Post Control	15	0.020

The results of data analysis using the Kolmogorov test on the average blood sugar level of the experimental and control groups obtained p value = 0.200 ($p > 0.005$) and $P = 0.020$ ($p > 0.020$), which means that the average blood sugar level in this study was normally distributed.

Table 4. Difference in Average Blood Sugar Levels before Intervention and Blood Sugar Levels after Intervention in the Experimental Group

Variable	N	Mean	Difference mean	SD	Min	Max	P value
KGD Pre	15	186.00	25.67	24.437	150	230	0,007
KGD Post	15	160.33		19.316	120	195	

The results of the table analysis can be concluded that the average blood sugar level before the intervention in patients with type 2 diabetes in the experimental group was 186.00 with a mean difference of 25.67, a standard deviation of 24.437 with a minimum value of 150 and a maximum of 230. Intervention obtained an average value of 160.33, standard deviation 19,316 with a minimum value of 120 maximum 195. After a significant test was carried out using the paired T Test on the comparison of blood sugar levels before and after the Prolanis exercise in the experimental group, there was a significant change with p value 0.007.

Table 5. Difference in Average Blood Sugar Levels before Intervention and Blood Sugar Levels after Intervention in the Control Group

Variable	N	Mean	Difference mean	SD	Min	Max	P value
KGD Pre	15	150.31	22.98	23.053	110	185	0,001
KGD Post	15	127.33		14.864	100	155	

The results of the table analysis can be concluded that the average blood sugar level before the intervention in patients with type 2 diabetes in the control group was 150.31 with a mean difference of 22, 98, a standard deviation of 23,053 with a minimum value of 110 and a maximum of 185. Intervention obtained an average value of 127.33, a standard deviation of 14.864 with a maximum value of 100 with a maximum of 155. After a significant test was carried out using the paired T Test on the comparison of blood sugar levels before and after Prolanis exercise in the control group, there was a significant change with p value 0.001.

Table 6. Comparison of blood sugar levels after intervention in the experimental group and before intervention in the control group

Group	Mean	SD	P Value
Intervention Group (N=15)	160,33	19,316	0,000
Control Group (N=15)	132,33	15,221	0,000

From the results of table analysis in the experimental group and the control group using the T Independent test, it was found that P-Value = 0.000 ($P < 0.05$) means that H_0 is rejected. Control after intervention.

Women are more at risk of developing type 2 diabetes because physically women have a greater chance of increasing body index. Monthly cycle syndrome (Premenstrual Syndrome), post-menopause which makes the distribution of body fat more easily accumulated due to this hormonal process so that women are at risk of suffering from type 2 diabetes. Based on gender, it is grouped into 2 categories, namely male and female sex. The experimental group of type 2 diabetes mellitus sufferers in the Padangmatinggi health center, Padangsidimpuan city, who were included in this study were 15 people, the majority of which were male as many as 8 respondents (53.3%) and the minority of women as many as 7 respondents (46.7%). Meanwhile, the control group of patients with type 2 diabetes mellitus at Puskesmas Padangmatinggi Kota Padangsidimpuan were included in this study as many as 15 respondents, the majority of women were 10 respondents (66.7%), and a minority of men were 5 people.

Age at risk for diabetes is especially at the age of more than 40 years, because at that age there is an increase in glucose intolerance. The aging process reduces the ability of pancreatic cells to produce insulin. Based on the results of the study, it can be seen that the majority of the age

of the Diabetes mellitus experimental group in the Padangmatinggi community health center, Padangsidimpuan city, who were included in this study were 15 people, where the majority were 56-65 years old, namely 5 people (33.3%), and a minority aged 36-45. years, as many as 2 people (13.3%). Whereas in the control group, the majority of the respondents were 46-55 years old, 7 people and the minority respondents aged 36-45 were 2 people (13.3%).

Education level is related to a person's ability to receive information and adopt and organize it into a single knowledge. Education is one of the most important elements in obtaining information. The level of education has an influence on the incidence of type 2 diabetes mellitus (Blomster et al., 2017; Gress et al., 2000; Zhang et al., 2017). People with high levels of education will usually have a lot of knowledge about health so that with this knowledge people will be more able to maintain their health. Based on the results of research in the experimental / intervention group of people with diabetes mellitus at the Padangmatinggi public health center, Padangsidimpuan city, who were included in this study were 15 people, the majority of respondents with high school education were 8 people (20%). And a minority of Diploma / Bachelor degree as many as 7 people (80%). Whereas in the control group the majority of Diploma / Bachelor degree were 13 people (86.75), and a minority with high school education (2 people) (13.3%).

Based on the results of research in the experimental / intervention group of people with Diabetes mellitus at the Padangmatinggi Public Health Center, Padangsidimpuan City, 15 people were included in this study, the majority of respondents worked as civil servants, as many as 12 people (66.7%). And a minority of respondents have retired, namely 3 people. While in the control group, the majority of respondents were civil servants as many as 12 people (20.0%). And a minority of respondents work as civil servants, as many as 12 people (80.0%). The results of the study in the intervention group showed that the decrease in blood sugar levels after doing Prolanis exercise, namely where the average blood sugar level before the intervention was 186.00 mg / dl, with an SD of 24.437 and after the intervention the blood sugar level was 160.33 mg / dl. , with an SD of 19,316. The respondent's blood sugar level before the intervention was high blood sugar level, this was influenced by several factors, one of which was age. The results of this study showed that most of the respondents in the intervention group were 56-61 years old as many as 5 people (33.3%), meaning that at this age there was a decrease in the endocrine function of the pancreas which functions to produce insulin.

This is what triggers the increasing relevance of diabetes. The results of the study in the control group showed that the decrease in blood sugar levels after doing Prolanis exercise, namely where the average blood sugar levels before the intervention were 150.31 mg / dl with SD 24.730 mg / dl, and after the intervention the blood sugar levels became 127.33 mg / dl with SD 14.764. mg / dl. Blood sugar levels of some respondents did not experience a decrease in the mean blood sugar levels. This can be caused by the age factor, from the results of the study of 7 respondents in the control group aged 56-65 years (46.7%). The results of this study found that prolanis exercise had an effect on blood sugar levels. This can happen because physical or exercise is directly related to the increase in the speed at which the muscle glucose restores (how much muscle takes glucose from the bloodstream). When exercising, the muscles use up the glucose stored in the muscles and when glucose is reduced, the muscles fill in the gaps by taking glucose from the blood. This will result in a decrease in blood glucose, thereby increasing blood glucose control.

One of the benefits of prolanis exercise is to prevent obesity by burning calories in the body so that blood glucose can be used for energy. The results of the research on the Independent T Test blood sugar levels in the intervention group and the control group P-value was 0.000 <0.05, so it can be concluded that there were differences in blood sugar levels in the groups that were given prolanic exercise and those who were not given prolanic exercise. Prolanic

gymnastics namely low impact and rhythmic aerobic exercise aims to increase optimal physical fitness and increase the use of glucose by active muscles so as to reduce blood glucose, help release anxiety, stress and tension so as to provide a feeling of health and fitness.

This research is in line with research conducted by Salindeho & Rottie (2016) on the effect of prolanic exercise on blood sugar levels of type 2 diabetes mellitus sufferers in Persadia gymnastics, Gorontalo District. The results of this study indicate that there are differences in blood sugar levels before and after the Prolanis exercise, with a P-value of 0.000.

Conclusion

Based on the results of the research and discussion, it can be concluded that the blood sugar levels before and after doing Prolanis exercise in the intervention group the average blood sugar levels before the intervention was 186.00 mg / dl and after the intervention the blood sugar levels were 160.33 mg / dl. Blood sugar levels before and after doing Prolanis exercise in the control group the average blood sugar levels before the intervention were the average blood sugar levels before the intervention 150.31 mg / and after the intervention the blood sugar levels were 127.33 mg / dl. The influence of the application of prolanic exercise activities on the reduction of blood sugar levels in type 2 diabetes mellitus sufferers in Padangmatingi Health Center, Padangsidempuan City with a P-Value of 0.007 There are differences in blood sugar levels in the intervention group and the control group with a P. Value of 0.000.

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