PROLANIS PROGRAM (DIET, MEDICATION, AND PHYSICAL ACTIVITY) ON GLYCEMIC CONTROL OF TYPE 2 DM PATIENTS IN MAKASSAR CITY

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ABSTRACT

Background: Blood sugar levels in people with diabetes can be controlled by managing a healthy diet and doing physical exercise. Diabetes mellitus treatment is one of the treatments included in the National Health Insurance (JKN) program in Indonesia. In the JKN era, the Diabetes Mellitus type 2 Chronic Disease Management Program was made one of the programs of the BPJS which was renamed the Program Pengelolaan Penyakit Kronis (Prolanis).

Aim: Knowing prolanis program (diet, medication, and physical activity) on glycemic control of type-2 DM patients

Method: The study was conducted in November 2023-Januari 2024 at Puskesmas Kassi-Kassi and Puskesmas Kalukubodoa. The number of samples at Puskesmas Kassi-Kassi was 183 people, and Puskesmas Kalukubodoa was 168 people with a total sample of 351 people with quantitative research methods using questionnaires.

Results: Based on the results of research conducted on 351 respondents, it can be explained that there were more respondents with a good diet, namely (92.6%), taking medicine according to doctor's recommendations, namely (91.2%). Respondents with moderate physical activity were (92.6%), and respondents with controlled glycemic control were more, namely (93.7%). The statistical test results obtained each p value = 0.000, this means that there is an effect of diet, medication, and physical activity (gymnastics) on the glycemic control of patients with type-2 diabetes.

Conclusion: In the prolanis program, there is an effect of diet, medication, and physical activity (gymnastics) on the glycemic control of type-2 DM patients in Makassar City.

Keywords: Diet, Medication, Physical Activity (Gymnastics), Glycemic Control, Type-2 DM

1. INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder that occurs in the body due to decreased insulin activity and or insulin secretion (1). The International Diabetes Federation (IDF) estimates that the global prevalence of diabetes in 2019 was estimated at 9.3% (463 million people) and is projected to increase to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045 (2). The World Health Organization (WHO) estimates that the number of people with diabetes mellitus will increase by 2030, namely India (79.4 million), China, the United States (30.3 million) and Indonesia (21.3 million) (3). Indonesia is in the top 10 countries with the highest number of people with diabetes mellitus, namely in 7th position with 10.7 million people (4).

Diabetes mellitus is mainly categorized into 2 subtypes, type 1 diabetes mellitus and type 2 diabetes mellitus. Type 1 diabetes mellitus is generally treated through insulin replacement therapy, type 2 diabetes mellitus is treated with oral hypoglycemics (1). Diabetes is characterized by high blood sugar levels over a long period of time (5). Serious long-term complications are cardiovascular disease, stroke, foot ulcers, damage to the eyes, and chronic kidney disease (6). Diabetes mellitus treatment therapy consists of five main components: dietary management, exercise, metabolic status monitoring, pharmacological therapy, and education (7). Most patients experience difficulties in self-management related to physical activity, healthy eating, medication use, blood glucose monitoring, and stress management (8).

Blood sugar levels in people with diabetes can be controlled by managing a healthy diet and doing physical exercise (9). Lifestyle interventions for people with diabetes include dietary changes, weight loss, increased physical activity, as well as effective stress management (10). Carbohydrate restriction in the diet can help maximize the benefits of body metabolism in diabetes control (11). Type 2 diabetes mellitus is associated with an increased risk of disordered eating behaviors, including binge eating disorder (12). Quality of medication use is a key factor in achieving positive outcomes in diabetes therapy (13). Higher levels of physical activity (more than 90 minutes per day) reduce the risk of diabetes by 28% (2,5).

Diabetes mellitus treatment is one of the treatments included in the National Health Insurance (JKN) program. Diabetes mellitus treatment is included in JKN because the list of diabetes medicines is listed in the National Formulary (Fornas) (14). The JKN program is a government program in providing health protection in the form of health maintenance with the aim of meeting basic health needs for people who have paid contributions or whose contributions are paid by the government with the assistance of the Social Security Organizing Agency (BPJS) (15).

In the JKN era, the Diabetes Mellitus type 2 Chronic Disease Management Program was made one of the programs of the BPJS which was renamed the Chronic Disease Management Program (Prolanis) (16). Prolanis in some areas is effective in reducing fasting blood sugar, HbA1c, and cholesterol levels in Diabetes Mellitus patients (17). But in its implementation, Prolanis has different barriers in each region (18).

2.   THEORETICAL FRAMEWORK

The American Diabetes Association (ADA) also defines diabetes mellitus as a collection of symptoms that arise in a person caused by an increase in blood glucose levels due to a progressive

decrease in insulin secretion (10). Type 2 diabetes mellitus (DM) is a diabetic disease that occurs due to body tissues that are resistant to the action of insulin. Each individual has an excess level of insulin resistance or may have a deficiency of β-cells, and can cause mild or severe abnormalities. Although the patient's β-cells still produce insulin, the insulin is insufficient to overcome the resistance and cause an increase in blood glucose. The inhibition of insulin can affect the fat metabolism process, causing free fatty acid flux and triglyceride levels to increase and causing high-density lipoprotein (HDL) levels to decrease (19).

Diabetes mellitus is the sixth leading cause of death in the world (20). South Sulawesi is one of the provinces in Indonesia with a high prevalence of diabetes mellitus. Based on the results of Riskesdas 2018, the prevalence of diabetes mellitus diagnosed by doctors for all ages and the highest was in Makassar City as the capital of South Sulawesi province, reaching 2.4%. This was followed by the city of Pare-pare. The high prevalence of DM in Makassar City can also be seen in the increase in the number of stroke and hypertension patients, which are included in the 10 largest diseases based on data from all health centers in Makassar City (21). Prolanis is a health service system and proactive approach implemented in an integrated manner involving participants, health facilities, and BPJS health in the context of health maintenance for BPJS health participants suffering from chronic diseases to achieve optimal quality of life with effective and efficient health service costs. The goal of prolanis is to encourage participants with chronic diseases to achieve optimal quality of life with an indicator that 75% of registered participants who visit the first-level health facility have good results on specific examinations of type II DM disease according to relevant clinical guidelines so as to prevent the onset of disease complications. The target of Pronalis itself is all BPJS participants with chronic diseases (Diabetes Mellitus type II and Hypertension). With the person in charge of this program is the BPJS Health Branch Office, Primary Service Management Section (22).

3.   METHOD

The research subject is human, in this study conducted by filling out a questionnaire that does not have the potential for harm and negative influence. Before conducting research, research permission was obtained from the Ethics Committee with letter number 6375/UN4.14.1/TP.01.02/2023, dated December 11, 2023. Furthermore, sending a research permit letter to the head of the health center which is the research site at Puskesmas Kassi-Kassi and Puskesmas Kalukubodoa. The research was conducted in December-January 2023 on type-2 diabetes mellitus patients, the number of samples at the Kassi-Kassi Health Center was 183 people and at the Kalukubodoa Health Center was 168 people with a total sample of 351 people. This study was conducted with quantitative methods as preliminary research to determine the effect of diet, glycemic control, and physical activity (gymnastics) on the glycemic control of patients with type 2 diabetes mellitus. Then further research was conducted to determine the effect of diet, glycemic control, and physical activity (gymnastics) on the glycemic control of patients with type 2 diabetes. Then further research was conducted to determine the effect of the prolanis program intervention model on the glycemic control of patients with type 2 diabetes.

Sample selection was carried out by stratified random sampling with inclusion criteria, namely: 1) Patients diagnosed with type 2 DM for at least 1 year, 2) Active participants of the prolanis program, 3) Cooperative and willing to become respondents. While the exclusion criteria are: 1) Patients who are not type 2 DM, and 2) Patients who do not attend prolanis activities.

4.   RESULTS

The general characteristics of the respondents are the characteristics inherent in the respondents. The characteristics of the respondents shown include gender, age, and latest education, with the following characteristics:

Table 1. Distribution of Respondents Based on Characteristics at Kassi Kassi Health Center and Kaluku Bodoa Health Center Makassar City

Variable	Health Center				Frequency	
	Kassi Kassi		Kaluku Bodoa			
	n	%	n	%	n	%
Gender						
Male	78	42,6	48	28,6	126	71,2
Female	105	57,4	120	71,4	225	128,8
Total	**183**	**100,0**	**168**	**100,0**	**351**	**100,0**
Age						
40-50 yo	97	53,0	89	53,0	186	53,0
51-60 yo	52	28,4	48	28,6	100	28,5
61-70 yo	28	15,3	26	15,5	54	15,4
71-80 yo	6	3,3	5	3,0	11	3,1
Total	**183**	**100,0**	**168**	**100,0**	**351**	**100,0**
Education						
Elementary	2	1,1	3	1,8	5	1,4
Junior High	18	9,8	21	12,5	39	11,1
High School	89	48,6	94	56,0	183	52,3
Undergraduate	74	40,4	50	29,8	124	35,2
Total	**183**	**100,0**	**168**	**100,0**	**351**	**100,0**
Occupation						
Housewife	51	27,9	73	43,5	124	35,7
Civil Servant	26	14,2	9	5,4	35	9,8
Private Job	63	34,4	64	38,1	127	36,2
Retired	43	23,5	22	13,1	65	18,3
Total	**183**	**100,0**	**168**	**100,0**	**351**	**100,0**
Duration of Type-2 DM						
1-5 Years	26	14,2	20	11,9	46	13,0

5-10 Years	82	44,8	91	54,2	173	49,5
>10 Years	75	41,0	57	33,9	132	37,5
Total	**183**	**100,0**	**168**	**100,0**	**351**	**100,0**

Table 1. above shows the characteristics of respondents. Respondents based on gender were more women, at Puskesmas Kassi Kassi (57.4%) and at Puskesmas Kaluku Bodoa (71.4%). Respondents by age were more 40-50 years old at Kassi Kassi Health Center (53.0%) and at Kaluku Bodoa Health Center (53.0%). Respondents based on education were more high school students at Puskesmas Kassi Kassi (48.6%) and at Puskesmas Kaluku Bodoa (56.0%). Respondents based on occupation were more private at Kassi Kassi Health Center (34.4%) and at Kaluku Bodoa Health Center, namely housewives (IRT) (43.5%). Respondents based on the length of time suffering from type-2 DM were more 5-10 years at Kassi Kassi Health Center (44.8%) and at Kaluku Bodoa Health Center (54.2%).

In this study, there are three independent variables, namely diet, medication, and physical activity (gymnastics) which will be seen for their relationship to the dependent variable, namely glycemic control of type 2 DM patients at Kassi Kasi Health Center and Kaluku Bodoa Health Center, Makassar City. The frequency distribution of the research variables can be seen in the following table:

Table 2: Respondents Based on Diet, Medication, And Physical Activity (Gymnastics) in Makassar City

Variable	Frequency (n)	Percent (%)
Eating Patterns		
Good	325	92,6
Deficient	26	7,4
Treatment		
As recommended by the doctor	320	91,2
Not as recommended by the doctor	31	8,8
Physical Activity		
Moderate	325	92,6
Low	26	7,4
Glycemic Control		
Controlled	329	93,7
Not Controlled	22	6,3
Total	**351**	**100.0**

Based on the results of research conducted on 351 respondents, it can be explained that there were more respondents with a good diet, namely (92.6%), taking medicine according to doctor's

recommendations, namely (91.2%). Respondents with moderate physical activity were (92.6%), and respondents with controlled glycemic control were more, namely (93.7%).

4.1   Effect of Diet on Glycemic Control of Type 2 DM Patients

The results of the analysis of the effect of diet on glycemic control of patients with type 2 diabetes can be seen in the following table:

Table 3. Effect of Diet on Glycemic Control of Patients in Kassi Kasi Health Center and Kaluku Bodoa Health Center Makassar City

Eating Patterns	Glycemic Control				Frequency		p-value
	Controlled		Uncontrolled				
	n	%	n	%	n	%	
Good	322	99,1	0	0,9	325	100,0	**0,000**
Less	7	26,9	19	73,1	26	100,0	
Total	**329**	**93,7**	**22**	**6,3**	**351**	**100.0**	

The table shows that out of 351 respondents, there were more respondents who had a good diet with controlled glycemic control (99.1%), compared to a good diet with uncontrolled glycemic control (0.9%). Respondents who had a poor diet with uncontrolled glycemic control were more numerous, namely (73.1%), compared to a poor diet with controlled glycemic control, namely (26.9%). The statistical test results obtained a p value = 0.000, this means that there is an influence of diet on the glycemic control of patients with type 2 diabetes.

4.2   Effect of Treatment on Glycemic Control of Type 2 DM Patients

Table 4. Effect of Treatment on Patient's Glycemic Control at Kassi Kasi Health Center and Kaluku Bodoa Health Center Makassar City

Medicine	Glycemic Control				Frequency		p-value
	Controlled		Uncontrolled				
	n	%	n	%	n	%	
As Recommended by Doctor	317	99,1	3	0,9	320	100,0	**0,000**
Not in accordance with doctor's advice	12	38,7	19	61,3	31	100,0	
Total	**329**	**93,7**	**22**	**6,3**	**351**	**100.0**	

The table shows that out of 351 respondents, more respondents were treated according to doctor's recommendations with controlled glycemic control (99.1%), compared to treatment according to doctor's recommendations with uncontrolled glycemic control (0.9%). Respondents whose treatment was not in accordance with doctor's recommendations with uncontrolled glycemic

control were more numerous, namely (61.3%), compared to treatment not in accordance with doctor's recommendations with controlled glycemic control, namely (38.7%). The statistical test results obtained a p value = 0.000, this means that there is an effect of treatment on the glycemic control of type 2 DM patients.

4.3   Effect of Physical Activity (Gymnastics) on Glycemic Control of Type 2 DM Patients

Table 5. Effect of Physical Activity (Gymnastics) on Glycemic Control of Patients at Kassi Kasi Health Center and Puskesmas Kaluku Bodoa Makassar City

Physical Activity (Gymnastics)	Glycemic Control				Frequency		p-value
	Controlled		Uncontrolled				
	n	%	n	%	n	%	
Medium	321	98,8	4	1,2	325	100,0	**0,000**
Low	8	30,8	18	69,2	26	100,0	
Total	**329**	**93,7**	**22**	**6,3**	**351**	**100.0**	

The table shows that out of 351 respondents, more respondents had moderate physical activity with controlled glycemic control (98.8%), compared to moderate physical activity with uncontrolled glycemic control (1.2%). Respondents with low physical activity with uncontrolled glycemic control were more numerous, namely (69.2%), compared to low physical activity with controlled glycemic control, namely (30.8%). The statistical test results obtained a value of p = 0.000, this means that there is an effect of physical activity (gymnastics) on the glycemic control of type 2 DM patients.

5.   DISCUSSION

Diabetes is one of the fastest growing diseases worldwide, projected to affect 693 million adults by 2045 (23). The prevalence of diabetes is increasing worldwide. The International Diabetes Federation (IDF) estimates that 536.6 million people are living with diabetes (diagnosed or undiagnosed) in 2021, and this number is projected to increase by 46%, reaching 783.2 million by 2045 (24). Diabetes and its complications have a significant economic impact on individuals and their families, health systems and national economies (25). Diabetes is a leading cause of disability and death (26). Behavioral factors are important modifiable factors for the prevention and management of diabetes (27).

Diabetes mellitus is ranked 7th in the top 10 diseases that cause death in the world, with 90%-95% of cases being type 2 DM (28). Diabetes mellitus is a chronic disease that requires long-term care (29). Diabetes is a chronic disease that requires significant changes in lifestyle and adherence to diet, social support is a major factor for patients to increase confidence in taking care (30).

The results of statistical tests show that there is an effect of diet, medication, and physical activity (gymnastics) on the glycemic control of patients with type 2 diabetes in Makassar City p=0.05. It

is important for people with type 2 diabetes mellitus to eat healthily. However, implementing dietary advice in daily life is difficult, as eating is not a discrete act, but a series of activities, embedded in social practices and influenced by previous life experiences (31).). Individuals with type 2 diabetes require long-term dietary strategies for blood glucose management and can benefit from a good diet (32).). Self-management practices are essential for the management of type-2 diabetes mellitus (30).

Treatment rate is defined as the proportion of individuals receiving diabetes treatment, including oral medications, insulin, dietary management, and increased physical activity (27). Some examples of medication-related problems most commonly found in patients with type-2 diabetes mellitus are adherence (medication not taken, as well as drug side effects (33)(34) (13). Family support is defined as the perception of support obtained from family members, including nuclear family, extended family, relatives and friends. Good family support will affect the implementation of the diabetes mellitus treatment program that patients undergo. Patients with DM with good family support have adherence to treatment and better blood sugar control than patients without family support (29). The results of Yanto's research (2017) showed that family support in patients with type II diabetes mellitus in the city of Semarang was dominated by the good category of 72.9% (35).

Physical activity can control blood sugar (36). Physical activity in patients with DM has a very important role in controlling blood sugar levels, where when doing physical exercise there is an increase in glucose utilization by active muscles so that it can directly cause a decrease in blood glucose (37). Physical activity is very closely related to non-communicable diseases, because if someone does not do physical activity 30 minutes per day or 3 times a week (38) there will be an accumulation of fat in the body and insufficient insulin to convert glucose into energy, then DM will arise, glucose will increase and type 2 DM will occur. Lack of physical activity or can increase the occurrence of DM. The success of a program is influenced by the compliance of DM patients in carrying out therapy, the availability of supporting resources, and the implementation of routine and sustainable programs.

6.   CONCLUSION

Based on the research results, it can be concluded that:

a.   There is an effect of diet on glycemic control of type-2 DM patients in Makassar City.

b.   There is an effect of medication on the glycemic control of type-2 DM patients in Makassar City.

c.   There is an effect of physical activity (gymnastics) on the glycemic control of type-2 DM patients in Makassar City.

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