Diet Compliance Determinants in Patients with Diabetes Mellitus in the City of Banda Aceh and Aceh Besar

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*Abstract— **Introduction**: Diabetes mellitus and dietary compliance are issues that are important to study to see the relationship between diabetes mellitus and one of the pillars of managing diabetes mellitus, namely dietary compliance in suppressing the spread and management of Diabetes Mellitus among the community. **Objective**: Determinants of Diet Compliance in Patients with Diabetes Mellitus in the City of Banda Aceh and Aceh Besar. **Methodology**: This study used a cross-sectional design and used secondary data from a collaborative research team between Syiah Kuala University and Gontingen University, Germany from 2018 to 2020. The sample in this study was 137 people. The data used in this study are data related to age, occupation, level of knowledge, complications, medication adherence, utilization of health facilities, HbA1c levels, and body mass index from the study coordinator. **Results**: The results of this study indicate that there is a relationship between the utilization of health facilities and dietary adherence in people with diabetes mellitus with a value of p=0.001, the level of knowledge with dietary compliance with a value of p=0.005 and a relationship between complications of Diabetes Mellitus and dietary compliance with a value of p=0.036. **Conclusion**: there are isdeterminants of dietary compliance in patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar. Recommendation: it is hoped that people with diabetes mellitus, especially in the City of Banda Aceh and Aceh Besar, will make the best use of health facilities and adhere to dietary compliance patterns so that diabetes mellitus can be controlled so that complications do not occur, and HbA1c levels remain normal.*

Keywords— Diterminants, Diet Compliance, Diabetes mellitus.

I. INTRODUCTION

Diabetes Mellitus is a major public health problem and is one of the four non-communicable diseases that is a priority for action by policymakers around the world. The number of cases and prevalence of diabetes has been steadily increasing over the last few decades. The International Diabetes Federation (IDF) stated that in 2000 there were (151 million) people with diabetes, then in 2010, there were (284.6 million), while in 2019 the IDF noted that there were (463 million) adults aged 20-79 years suffering from diabetes. diabetes mellitus and around 4.2 million adults aged 20-79 years died from diabetes and its complications in 2019 (International Diabetes Federation, 2019).

According to the World Health Organization (WHO) (2016), the number of people with diabetes has increased from 108 million people in 1980 to 422 million people in 2014. Based on the 2016 ADA, in 2010 as many as 25.8 million Americans had diabetes and in In 2012 the number increased to 29.1 million people.

Diabetes Mellitus (DM) is a chronic metabolic disorder disease that is better known as the "Silent killer". Often humans do not realize that they person has diabetes, and often experience delays in treating it so many complications occur. Diabetes is also known as the "Mother of Disease" which is the parent or mother of other diseases such as hypertension, heart and blood vessel disease, stroke, kidney failure, and blindness. The World Health Organization (WHO) in 2011 stated that the number of people with diabetes mellitus in the world is around 200 million people, Indonesia ranks fourth in the number of people with diabetes mellitus in the world after India, China, and the United States. In 2011, there were around 5.6 million Indonesians who had diabetes mellitus (Anggraeni, 2018).

Diabetes mellitus comprises a heterogeneous group of disorders, which are usually divided into type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) caused by genetic and environmental factors. Type 1 diabetes involves autoimmune insulin deficiency while type 2 diabetes will affect the pathological state of insulin deficiency and insulin resistance (Yang, et al., 2022).

The shift in the pattern of degenerative diseases that have occurred in Indonesia has increased. Degenerative diseases are chronic non-communicable diseases such as heart disease, hypertension, diabetes, obesity, and others. Indonesia is currently bearing a double burden of disease in the health sector, namely infectious diseases which are still rampant coupled with various degenerative chronic diseases (Handajani, 2010).

The death rate due to Diabetes Mellitus in 2008 and 2017 is estimated at 6,899 with the highest percentage in female patients, namely 3,776 deaths (54.73%). Predominantly in the elderly over 80 years with a total of 2,283 deaths (33.09%). The most common causes of death were uncomplicated (3.147 or 45.62%), kidney complications (1.731 or around 25.09%), and multiple complications (569 or 8.25%) (Dos Santos, et al., 2022).

The International Diabetes Federation (IDF) also revealed that of the 415 million people with diabetes mellitus in the world, of which there are 153 million sufferers in Southeast Asia and Australia, as many as 78.3 million people in South

Asia and East Asia, 35.4 million people in Central Asia. and North Africa, 14.2 million people in Africa, 59.8 million people in Europe, 29.6 million people in Central America and South America, and finally there are 44.3 million people in North America and the Caribbean Islands (IDF, 2019).

Indonesia is ranked fourth out of the top ten countries in the world, cases of type 2 diabetes mellitus with a prevalence of 8.6% of the total population, are expected to increase from 8.4 million people in 2000 to around 21.3 million people in 2030. In the prevalence of diabetes mellitus diagnosed in 2018, the largest sufferers were in the age category 55 to 64 years, namely 6.3%, and 65 to 74 years, namely 6.03% (Riskesdas, 2018).

According to the results of a survey conducted by the Banda Aceh City Health Office in 2016, Nanggroe Aceh Darussalam Province, there were data on Pre-Elderly (45-59) who had Diabetes Mellitus, namely 12,138 people, while data in 2017 from January to April, there were Pre-Elderly (45-59) who had Diabetes Mellitus was 2,512 people. Aceh is included in the list of the top nine regions in Indonesia where many people suffer from Diabetes. It is estimated that the number reached 417,600 people or around 8.7% of the total population of Aceh.

The increase in the number of Diabetes Mellitus proves that this disease is the most serious public health problem. The management of Diabetes Mellitus is known for its 4 main pillars in management, one of which is meal planning. Nutrition therapy is a major component in the successful management of diabetes mellitus. Patient compliance with nutritional principles and meal planning is often an obstacle for patients. Diabetics feel tormented by the type and amount of food recommended.

The principle of diet for people with DM is almost the same as the food recommendations for the general public, balanced food according to the calorie and nutrient needs of each individual. DM sufferers need to be emphasized the importance of regular eating schedules, types, and amounts of calorie content, especially in those who use drugs that increase insulin secretion or insulin therapy itself (Perkeni, 2015).

The pattern of eating is the repetition of food arrangements that occur when eating. A diet is about the types, proportions, and combinations of food eaten by an individual, community, or group of population. Fast food contributes to an increase in body mass index so that a person can become obese. This happens because of the high fat and sugar content in fast food. In addition, the increase in portions and frequency of eating also affects the increase in obesity. People who consume high-fat foods experience faster weight gain than those who consume high-carbohydrate foods with the same number of calories (Kumalasari et al, 2009).

Diet therapy with calorie control is often confusing and difficult to follow because it requires patients to measure their portion sizes and the type of food they eat. This can be related to the limited intellectual ability of the patient to understand the material (Smeltzer & Bare, 2002).

Long-term adherence to food planning is one of the most challenging aspects of the management of diabetes mellitus (Smeltzer & Bare, 2002). Even though they have received counseling about meal planning more than 50% of diabetic patients do not carry out advice regarding food planning, so the role of evaluation and education is very important (Tjokroprawiro, A. 2002).

Compliance with the diabetes diet plays an important role in stabilizing glucose levels in people with diabetes mellitus, while adherence itself is an important thing to be able to develop routines or habits that can be followed by sufferers in following a diet schedule which is sometimes difficult for sufferers to do (Phitri, 2013).

II. METHOD

The method in this study used a cross-sectional design. In this study, secondary data was used from a collaborative research team between Syiah Kuala University and Gottingen University, Germany.

A. Location and Time of Research

The research was conducted in the Aceh Besar District and Banda Aceh City from 2018 to 2020.

The sample in the study was 137 people. Determination of the sample in the study was carried out using non-probability sampling using the convenience sampling technique, which is if a person is found to fulfill the sample criteria and can be used as a data source.

III. RESEARCH RESULT

From Table 1. It can be seen that the average age distribution of diabetes mellitus patients in the City of Banda Aceh and Aceh Besar is 53 years, with a standard deviation of 10.14 years. The youngest is 22 years old and the oldest is 80 years.

The average distribution of body mass index of patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar is 26.2 kg/m2 with a standard deviation of 4.9 while the lowest body mass index is 17 kg/m2 and the highest is 47 kg/m2.

The average distribution of HbA1c levels in patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar is 10%, with a standard deviation of 2.35. The lowest HbA1c level was 4.7% and the highest was 16.9%.

TABLE 1. Frequency Distribution Based on Age, BMI, and HbA1c Levels in Diabetes Mellitus Patients

No	Variabel	Mean	SD	Minimal – Maksimal
1	Age (years)	53,58	10,14	22 – 80
2	Body Mass Index (kg/m2)	26,2	4,9	17-47
3	HbA1c Level (%)	10	2,3	4,7-16,9

Table 2 shows that the distribution of work for diabetes mellitus patients in the City of Banda Aceh and Aceh Besar is mostly housewives, with 71 people (51.8%). While the sex of the diabetes mellitus patients in the City of Banda Aceh and Aceh Besar, the majority of sufferers were women, 98 people (71.5%). As for the distribution of knowledge levels in patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar, most of them were low, namely 75 people (54.7%).

The distribution of complications in patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar mostly experienced only 1 complication, namely 94 people (68.6%). The distribution of the utilization of health facilities for patients with diabetes mellitus in the City of Banda Aceh and Aceh Besar mostly used health facilities, namely 119 people (86.9%). The level of adherence to taking medication for diabetes mellitus patients in the City of Banda Aceh and Aceh Besar was mostly disobedient, namely 104 people (75.9%)

TABLE 2. Frequency Distribution of Respondents Based on Occupation, Gender, Knowledge Level, Complications, Utilization of Health Facilities, and Medication Compliance in Diabetes Mellitus Patients.

Characteristics		N	%
Gender	Man	39	28.5
	Woman	98	71.5
Job Status	Not/not yet working	34	24,8
	Farmers/fishermen/workers	14	10,2
	Private	18	13,1
	Housewife	71	51.8
	Total	250	100
Knowledge level	Tall	62	45,3
	Low	37	54,7
Complications	Only 1 complication	94	68,6
	> 1 complication	43	31,4
Use of Health Facilities	Utilize Healthcare	119	86.9
	Not Utilizing Health Facilities	18	13,1
Medication Compliance	obey	33	24,1
	Not obey	104	75.9
	Total	137	100

From Table 3. It shows that 115 respondents (96.6%) took advantage of health facilities, while 4 respondents (3.4%) did not comply. The statistical test results obtained p = 0.001, so it can be concluded that there is a relationship between the utilization of health facilities and dietary compliance.

TABLE 3. Relationship between Health Facility Utilization and Diet Compliance

Utilization of Health Facilities	Dietary Compliance				T	OR (95% CI)	P Value
	obey		Not obey				
	f	%	f	%			
Utilise	115	96,6	4	3,4	119	11,058	0,001
NoUtilise	13	72,2	5	27,8	18		
Total	128	93,4	9	6,6	137	(2,6-46,4)	

From Table 4. It shows that people with diabetes mellitus with a low level of knowledge are more obedient to dietary patterns, as many as 66 people (88.0). The statistical test results obtained p = 0.005, so it can be concluded that there is a relationship between the level of knowledge and dietary compliance in people with diabetes mellitus.

TABLE 4. Relationship between Knowledge Level and Diet Compliance in Diabetes Mellitus Patients

Knowledge level	Dietary Compliance				T	OR (95% CI)	P Value
	obey		Not obey				
	f	%	f	%			
Tall	62	100	0	0	62	1,045	0,005
Low	66	88,0	9	12,0	75		
Total	128	93,4	9	9,0	137	(1,0-1,2)	

Table 5 shows that 85 respondents (90.4%) had diabetes

mellitus who had only one complication and adhered to a dietary pattern, while 43 respondents had more than one complication. Based on the table above, it can be concluded that there is a relationship between complications and dietary compliance. The statistical test results obtained p = 0.036.

TABLE 5. Relationship of Complications with Diet Compliance in Diabetes Mellitus Patients

Complications	Dietary Compliance				T	OR (95% CI)	P Value
	Obey		Not obey				
	f	%	f	%			
Only 1 complication	85	9,4	9	9,6	94	0,904	0,036
>1 complication	43	100	0	0	43		
Total	128	93,4	9	6,6	137	(0,847-0,966)	

IV. DISCUSSION

The Relationship between Utilization of Health Facilities and Diet Compliance in Patients with Diabetes Mellitus

This study found a relationship between the use of health facilities and dietary compliance in people with diabetes mellitus, obtained p = 0.001. In this study, patients who used health facilities were more compliant with dietary patterns by 96.6%, while patients who were disobedient or did not use health facilities were 3.4%. Patients with diabetes mellitus utilize health facilities to undergo treatment and carry out consultations related to their disease conditions.

In line with research conducted by Sudirman (2021) which states that there is a relationship between people with diabetes mellitus adhering to diets because by frequently utilizing health service facilities, respondents will obtain information about the disease they are suffering from and can carry out the diet as recommended by health workers.

The results of this study are also following research conducted by Altera (2011) which said that adherence to implementing a diet is closely related to the information that respondents obtained from health workers after utilizing health service facilities.

This study is in line with Akmal's research (2012) which showed a significant relationship between the role of health workers and compliance in managing the diet of DM patients with an influence percentage of 93.3%. The support of health workers is needed to improve adherence, for example through communication. This is following the existing theory, where health workers are the first to know about the patient's health condition so they have a big role in conveying information about health conditions and things that must be done by patients for their recovery process. This communication can be done through health education in the form of counseling.

The Relationship between Knowledge Level and Dietary Compliance in Patients with Diabetes Mellitus

In this study, it was found that people with diabetes mellitus with a low level of knowledge were more adherent to dietary patterns. Based on the results of the analysis, it was obtained that the value of p = 0.005, it can be concluded that there is a relationship between the level of knowledge and dietary compliance in people with diabetes mellitus.

This is in line with research conducted by Sudirman (2021) that knowledge has a relationship with dietary disobedience in people with Diabetes Mellitus. One of the efforts to prevent Diabetes Mellitus is to provide information to people with Diabetes Mellitus either through direct counseling or through electronic media or mass media about the benefits of diet, how to prevent Diabetes Mellitus, and foods that should be consumed by people with Diabetes Mellitus, especially when blood glucose levels increase.

The results of this study are in line with research conducted by Phitri (2013) concerning the relationship between the level of knowledge and the level of adherence to the diabetes mellitus diet, where some respondents had good knowledge, namely 75.7%. While respondents with sufficient knowledge were 21.6% and only 2.7% had less knowledge. According to him, the lack of knowledge is caused by the age, gender, and occupation of the respondents. This is most likely caused by the lack of exposure to information about Diabetes Mellitus by respondents and how eating arrangements or diets should be implemented. The lack of patient interest in participating in consultations with nutritionists also affected the respondents' knowledge. From the results of interviews with respondents, It is known that respondents rarely do counseling at the Nutrition Polyclinic after checking their blood sugar levels. There are still 36.7% of respondents who have never done nutrition counseling before.

This study is also in line with research conducted by Tania (2016) on type 2 DM outpatients at Fatmawati General Hospital, stating that respondents who had a good level of knowledge were 12.5 times more compliant in their diet than respondents who had less knowledge. The results also show that the level of knowledge is a risk factor for dietary adherence carried out by patients with diabetes mellitus type 2. The lack of knowledge can inhibit compliance behavior in health because sufferers will find it difficult to follow recommendations from health workers so that people with diabetes mellitus who have a high level of knowledge better understand and understand the recommendations for managing the diet.

Relationship of Complications with Dietary Compliance in Patients with Diabetes Mellitus

In this study, it was shown that diabetes mellitus sufferers who only experienced one complication and adherence to dietary patterns (90.4%). Complications with dietary compliance in people with diabetes mellitus in the City of Banda Aceh and Aceh Besar with a value of p = 0.036. The emergence of complications is influenced by various factors such as lack of adherence to treatment regimens, the low level of knowledge possessed by the two factors is interrelated because these factors will affect attitudes and behavior.

Providing enough energy to maintain or achieve normal body weight and upholding the main pillars of diabetes mellitus therapy so that people with diabetes can carry out normal activities. Compliance with the DM Diet is very influential in controlling blood sugar so as not to cause complications. The DM diet is also strongly influenced by knowledge, individual motivation, and family support.

This study is in line with the research of Ramadhan and Marissa (2015) The increase in the incidence of DM complications is closely related to an increase in age because more than 50% of DM sufferers occur in the age group> 60 years. In addition, long-suffering from DM will further increase the occurrence of complications. The longer the respondent suffers from DM, the respondent will have good knowledge and experience about diet so that he will comply with the recommended diet.

V. RESEARCH CODE OF ETHICS

Health research ethics committee syiah kuala university medical faculty in an effort to protect the human rights and well-being of research subjects, has carefully reviewed the research protocol entitled " *Analysis Of Participation Of Aceh Government Employees Who Have Become Donors At UDD PMI Banda Aceh City*" with protocol number *1141012P with no. Approval Number: 004/EA/FK/2023* on behalf of Syarifah Nurakmal and declared ethically feasible according to 7 (seven) 2011 WHO Standards and referring to the 2016 CIOMS guidelines.

VI. CONCLUSION

The results of the research on the determinants of depression in patients with diabetes mellitus in the city of Banda Aceh and Aceh Besar have answered the research objectives, namely:

1. There is a relationship between the utilization of health facilities and dietary compliance in people with diabetes mellitus in the City of Banda Aceh and Aceh Besar with a value of p = 0.001.
2. There is a relationship between the level of knowledge and dietary compliance in patients with diabetes mellitus in the Working Areas of Banda Aceh and Aceh Besar with a value of p = 0.005.
3. There is a relationship between Diabetes Mellitus complications and dietary compliance in diabetes mellitus patients in the Working Areas of Banda and Aceh Besar City with p=0.036.

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