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Relationship between Knowledge and Compliance with Diet and Blood Sugar Levels of Type 2 Diabetes Mellitus Patients

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Abstract. *DM type 2 is a disease characterized by hyperglycemia due to abnormalities in insulin secretion, insulin action or both. Knowledge and dietary adherence for sufferers are factors related to the successful management of blood sugar levels. The purpose of this study was to find out the relationship between knowledge and dietary compliance with blood sugar levels. This research is a type of correlation research with cross sectional. The study was conducted at the Mokoau Health Center in Kendari City on 38 respondents using purposive sampling. Data collection was carried out with a questionnaire and a sheet of the patient's blood sugar level. The eta test result was obtained p = 0.048 and the contingency test was obtained p = 0.003. So that it can be known the relationship between knowledge and dietary compliance with blood sugar levels. For this reason, it is hoped that health workers at the Mokoau Health Center can continue to provide education to sufferers*

Introduction

The World Health Organization (WHO) states that around 422 million people in the world suffer from DM, which mostly affects countries with a middle population World Health.[1] International Diabetic Federation data shows that Indonesia is ranked 7th in the world with a population of 19.47 million people[2]. Results, Basic Health Research according to the doctor's diagnosis category in the population aged ≥15 years was k1.5% in 2013 and increased by 2% in 2018[3]. Southeast Sulawesi also experienced an increase in cases, namely DM ranked 5th out of 10 diseases, 13,946 sufferers and as many as 3,026 sufferers in Kendari City. [4]

Chronic complications such as retinopathy, neuropathy and nephropathy, can occur in uncontrolled DM, so to prevent these complications it is necessary to control blood glucose regularly. Increased blood glucose levels in diabetics are influenced by knowledge and adherence to diet. Improvement of eating patterns for diabetics can be done by choosing foods according to the diet that is specifically recommended for diabetes. The results of the study show that there are still diabetic patients who have insufficient knowledge about adherence to diet. Routine blood glucose checks for people with diabetes mellitus are related to patient adherence to the diet given.[2] Therefore, this study will look for the

relationship between knowledge and dietary compliance with blood sugar levels in people with type 2 diabetes mellitus.

Method

This study is a type of correlation research with a cross-sectional approach on 38 samples of diabetics. Sampling in this study used purposive sampling. The research instrument was in the form of a questionnaire and an observation sheet on the results of examining the patient's blood sugar levels. Data analysis was used to test the correlation between knowledge and blood glucose levels using the ETA test, while the relationship between dietary adherence and blood glucose levels used the contingency test. To see the relationship between these variables statistically, a 95% degree of confidence is used ($\alpha = 0.05$). [9]

Results and Discussion

Characteristics of Respondents

Table 1 Distribution of Respondent Characteristics

Variabel		f	%
Age	Young Adults (26-45)	8	21,1
	Old Adult (46-65)	25	65,8
	Elderly (>65)	5	13,2
Gender	Male	17	44,7
	Female	21	55,3
Education	elementary school	3	7,9
	Junior high school	1	2,6
	Senior High School	12	31,6
	undergraduate school	22	57,9
Profession	housewife	11	28,9
	entrepreneur	6	15,8
	Private	8	21,1
	honorary employee	1	2,6
	government employees	9	23,7
	Retired	3	7,9
Family History	Yes	23	60,5
	No	15	39,5
Long Suffered	0-5	30	78,9
	>6	8	21,1
Educational History	Yes	38	100
	No	0	0

Table 1 shows that the most respondents are in the old adult age category (46-65 years) as much as 65.8%, the sex is mostly female 55.3%, the majority education level is at the tertiary level as much as 57.9%, the most jobs as IRT that is as much as 28.9%. Most respondents have a family history of suffering from DM, namely 60.5%, the duration of suffering is also the most in the range of 0-5 years, namely 78.9% and a history of receiving education that 100% of sufferers have received education.

Knowledge, Diet Compliance And Blood Sugar Levels

Table 2 Distribution of knowledge, dietary adherence and blood sugar levels

Variable		**f**	**%**
Knowledge	Fine	13	34,2
	Enough	13	34,2
	Not enough	12	31,6
Obedience	No	18	47,4
	Yes	20	52,6
Blood sugar levels	Not controlled	12	31,6
	Controlled	26	68,4

Table 2: 34.2% of respondents had knowledge, good category, 52.6% were in the obedient category and 68.4% of respondents had controlled blood sugar levels.

Knowledge Relationship with Blood Sugar Levels

Table 3 Relationship between Knowledge and Blood Sugar Levels

	Blood sugar levels	Total

		Not controlled		Controlled				*p-value*
		n	%	n	%	n	%	
Knowledge	Fine	5	13,2	8	21,1	13	34,2	*p=0,048
	Enough	3	7,9	10	26,3	13	34,2	
	Not enough	4	10,5	8	21,1	12	31,6	
Total		12	31,6	26	68,4	38	100	

Table 3 shows that respondents with good knowledge have controlled sugar levels of 21.1%. The Eta Correlation test results showed a significance of p=0.048

Relationship of Dietary Compliance with Blood Sugar Levels

Table 4 Diet Compliance with Blood Sugar Levels

		Blood sugar levels				Total		*p-value*
		Not controlled		Controlled				
		n	%	n	%	N	%	
Dietary compliance	Not obey	10	26,3	8	21,1	18	47,4	*p=0,003
	Obey	2	5,3	18	47,4	20	52,6	
Total		12	31,6	26	68,4	38	100	

Table 4, it was found that respondents who were not compliant with the DM diet had uncontrolled glucose levels of 26.3%. Meanwhile, respondents who adhered to the DM diet had a controlled sugar level of 47.4%. The Contingency Coefficient test results were p=0.003.

Discussion

DM is predicted to increase to 200 million sufferers in 2040, so globally this is a burden for health in general. Chronically elevated blood glucose levels above normal have an impact on other metabolic abnormalities in patients with diabetes mellitus which can cause damage to various organ systems, leading to the development of life-threatening complications namely microvascular and macrovascular complications which cause an increased risk of cardiovascular disease 2 to 4 times[10]

The results of this study were that 65.8% of DM sufferers were mostly older adults (46-65 years). Research shows that the age of 50 years is an age with a dangerous ratio in the case of Diabetes Mellitus accompanied by risk factors that can cause fibrosis11. This study is corroborated by the results of previous research which showed that at the age of 46-60 years, more people had type 2 diabetes mellitus. This is in line with research showing that the older you are, the higher your risk of developing diabetes mellitus and experiencing complications of the diabetic foot. Fasting blood glucose levels have a risk of 1.4 times being abnormal at a person's age ≥45 years12. At this age the risk of DM events increases due to increased glucose intolerance at age ≥45 years. Along with the aging process has an impact on less or even no insulin produced by pancreatic beta cells[13]

This study shows that there are more women than men. This is in line with research that men suffer less from DM than women (69.1%), where women are more likely to have high LDL-C than men14. Research shows that fasting blood sugar levels increase in female respondents compared to men, namely 58.9% compared to 41.1%. Research shows that respondents who have a risk of diabetic foot complications in DM sufferers are dominated by female respondents, namely 73.1%.[15]

Dyslipidemia,, is closely related to age in women, but negatively related to age in men. Older age is associated with an increased risk of dyslipidemia in women, whereas a decreased risk of dyslipidemia in men. This, perhaps, is because menopause is a significant risk factor for dyslipidemia in older women[17]

Women physically have a higher body mass index than men, and women also have a history of pregnancy which is a risk factor for DM. Women also have LowkkDensity Lipoprotein (LDL) or bad cholesterol and higher triglyceride levels compared to men, so women are more at risk of suffering from DM[17]

Research shows that respondents with higher education suffer more from DM, namely 57.9%. A person's belief in the desired state of health will influence his behavior and the emergence of a person's motivation and willingness is influenced by knowledge, including the level of education19. This statement is in line with the theoretical concept that in addition to a person's high education for self-management of DM cases, motivation and support will increase a patient's adherence to self-management[20]

There is a difference in these results, this happens because of the level of education, understanding, abilities including knowledge

possessed by a person. So someone with a low level of education but has the ability to manage himself so that the results obtained will also be better. In general, the level of education in the high category of Yitu respondents is formal education, which does not describe special education related to the problem of DM [21]

The sample in this study was mostly housewives (IRT) suffering from DM by 28.9%, the most compared to respondents with other professions. Research, which shows that the majority of DM sufferers are IRT22. DM sufferers are more common in someone with increased working hours and irregular schedules, this is a major factor in increasing the incidence of DM[23]

Most respondents in the study had a family history of DM, namely 60.5%. Samples with a family history of diabetes mellitus have a greater risk than those with no family history. This is reinforced by previous studies with the results that 56.4% of people with diabetes mellitus have a family history of diabetes mellitus [24]

The results of the study also showed that the longest suffering period was in the range of 0-5 years, namely 78.9%. This is in line with research, namely as much as 63.4%.[13]

1. Knowledge

The results of the study obtained data that good and sufficient knowledge is more dominant than knowledge in the less category and the results of the analysis show a relationship Knowledge of blood glucose levels. The results of this study are in line with research showing that knowledge has a significant relationship to glycemic control in DM patients25. Other studies also show that knowledge has a significant relationship with blood sugar levels.[26]

Respondents' knowledge about the DM diet is related to how to control glycemic levels, especially in preventing blood sugar levels from rising27. Knowledge of someone related to DM is very important for patients, who support patients in carrying out DM management, patient behavior based on knowledge and positive attitudes will last forever. Patients will understand about their illness, including changing behavior in dealing with their health problems, this is caused by the knowledge or education that we provide.[19]

There is a relationship between a person's level of knowledge and blood sugar levels, because knowledge is important to support the formation of one's actions and the average DM sufferer who is in an area who has a good level of knowledge, this is because respondents often take part in educational activities or outreach about diet programs in controlling blood glucose levels which is usually carried out by health workers, the result of this activity is that behavior can be created because it is based on knowledge. Improving a person's ability to control his will in managing Diabetes Mellitus, will regularly affect the behavior of sufferers in controlling blood glucose levels. So the formation of one's behavior, the most important domain is knowledge.[28]

2. Dietary Compliance

This study obtained results where the patient's dietary adherence was more than those who were not compliant. This is in line with other studies which show that there is a relationship between dietary adherence and blood glucose levels. Patients who do not adhere to the DM diet have 14 times the risk of experiencing poor blood glucose compared to patients who adhere to the DM diet [30]

The non-drug approach is basically management for DM sufferers which starts with eating (dieting) according to caloric needs, exercising with sufficient physical exercise for some time. Medication is given, if the blood sugar level has not/does not meet the expected metabolic target levels or is said to be ineffective, then a drug approach can be taken, the drug given is Oral Hypoglycemic Drugs (OHO) or insulin injections can be given according to the dose or indication [31]

Compliance is part of a person's behavior both in terms of knowledge, attitudes and actions of people with diabetes in getting treatment, adherence to diet, exercise and/or lifestyle changes recommended by officials. And other factors that influence changes in the behavior of diabetics to become obedient or non-adherent to treatment programs, which can be influenced by predisposing factors, and supporting factors as well as driving factors. Meanwhile, a person's non-compliance can be influenced by the understanding and interaction between the information giver and recipient of information, and most importantly the quality of the interaction between the information giver and recipient [19]

Conclusion

The conclusion from this study is that there is a significant relationship between knowledge and dietary compliance with blood sugar levels in type 2 DM patients.

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