SOCIOCULTURAL AND DIETARY INFLUENCES ON BLOOD GLUCOSE LEVELS OF DIABETES MELLITUS PATIENTS IN SELAYAR ISLANDS REGENCY

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Abstract

Diabetes Mellitus (DM) is a chronic metabolic disease that its appearance is influenced by various lifestyle factors. This research is to analyze whether sociocultural (knowledge, type of treatment, and family support) and eating patterns (type, amount, and frequency of food) have an influence on the blood glucose levels of diabetes sufferers in Selayar Islands Regency. The type of research used is analytical observational with a cross sectional study design. Bivariate analysis using the chi-square method showed that the variables related to blood glucose levels were knowledge (p=0.000), family support (p=0.000), type of food: yellow rice (p=0.004), potatoes (p=0.036), shellfish (p=0.042), tofu (p=0.015), apples (p=0.046), and eating frequency (p=0.010). After all the variables that had a significant relationship were included in the multivariate analysis, the results showed that those that had an influence on the blood glucose levels of DM sufferers were family support (p=0.000, OR=4.316), knowledge (p=0.000, OR=3.526), and type of food (p=0.004, OR=0.378). The findings of this study have implications for the need to rearrange priorities for health facility providers (both government and private) to reduce the level of DM by educating the public about DM mitigation (potential and risk), strengthening family roles, and standardizing food supplies.

Keywords: Diabetes Mellitus, Sociocultural, Diet, Blood Glucose Levels.

INTRODUCTION

According to various studies (Aas et al., 2023; Deng et al., 2024; Hwang et al., 2024; Sun et al., 2024), irregular eating patterns are a very instrumental factor in the incidence of diabetes mellitus (DM). the more irregular a person's diet, the more likely the person is to have DM. In more detail, Valencia (2023) expound that people with excessive eating habits at pre-elderly age tend to be at risk of DM during old age compared to people who are accustomed to eating enough. Such a diet is usually influenced by a number of factors. One of the factors that the influence is the most dominant is sociocultural factor (Bougma et al., 2023). The cultural aspect is very related to the pattern of one's food consumption, because it contains elements of knowledge, which are related to the function of the human mind. Therefore, education is needed by DM patients because obtaining sufficient education is an indication that the patient has sufficient understanding of treatment, self-management, and control of glucose levels in his body (Amiruddin et al., 2021). In the selection of treatment

options, for example, people with DM tend to rely on beliefs held by the social environment in which the person lives (Drozd, 2000). That is, beliefs contribute to self-management, which usually includes the choice of type of therapy, the choice of medicinal fetus (modern or traditional / herbal), determination of drug dosage, and so on that are considered efficacious for a person's recovery from DM.

According to a number of studies, people with socio-cultural characteristics towards modern dominant are wrong in providing treatment for DM sufferers. In Myanmar society (Wah Oo et al., 2020), for example, there are traditional beliefs that are actually misconceptions about the causes and management of DM. According to them, DM is a disease caused by karma (from the life before reincarnation, or from the present life). This trend of misconceptions also occurs in Kenya (Abdulrehman et al., 2016), but not in Norway (Norddal et al., 2022), where people have a more scientific, neat, and cautious perception of DM. However, it should be underlined from the two studies that, socio-cultural trends that have not advanced are directly proportional to socio-economic trends. Both in Kenya and Myanmar, people believe that DM is a curable disease. They rely a lot on herbal/traditional remedies, mainly because they make more sense for their economy. In addition, in Indonesia also revealed a new trend that the number of people with DM increases along with the increase in socio-economic status of the community (Kusumaningrum & Ricardo, 2022). This means that the more prosperous a group of people is, the higher the level of glucose consumption.

In Indonesia, the income and the education are the most dominant factors contributing to DM. The higher the income level, the risk of experiencing DM increased by 0.466%. Likewise, people who graduate from universities have a 2.86% higher risk of DM than people who graduate from elementary education (Kusumaningrum & Ricardo, 2022). This is confirmed by data from the results of Indonesia Basic Health Research 2018 (Kemenkes, 2020), which shows that the prevalence of DM in Indonesia based on diagnosis at the age of ≥ 15 years is 2%. This figure increased compared to the prevalence of DM in Indonesia Basic Health Research 2013 which was 1.5%. Blood sugar test results also increased from 6.9% in 2013 to 8.5% in 2018. This means, only about 25% of DM sufferers know that they suffer from DM. Especially in South Sulawesi, the prevalence of DM based on the results of Indonesia Basic Health Research 2018 is 1.8% (Kemenkes, 2020). Meanwhile, based on data from the early detection of NCD risk factors in South Sulawesi in 2022, the prevalence of DM is 1.73%. Especially in Selayar Islands Regency, the prevalence is 1.8% (Kemenkes, 2022). The number of DM sufferers in Selayar Islands Regency did decrease in 2021 (from 2,078 cases in 2020 to 1,328 cases in 2021), but increased again in 2022 (1,471 cases) (Public Health Office, 2022).

Considering the high number of DM sufferers in Selayar Islands, and the various studies above on socio-cultural and dietary influences on glucose levels, this study was conducted to answer the main problem: how is the socio-cultural and dietary influence on blood glucose levels in people with DM in Selayar Islands?. The answer to this question revealed a number of new discourses about knowledge about DM, cultural patterns of DM management, and food consumption patterns in the people of Selayar Islands. This urgency needs to be noted so that health professionals make the findings of this study to develop competencies that (Drozd, 2000)calls cultural competencies, namely interpersonal knowledge and skills that enable health professionals to understand, appreciate, and work with people from different cultural backgrounds to improve public health.

METHOD

This research was conducted after receiving recommendations and permission from the research ethics commission of the Faculty of Public Health, Hasanuddin University, Makassar with No. 5907/UN4.14.1/TP.01.02/2023. This study is observational analytic with a cross sectional design, which will be carried out in 6 sub-districts in Selayar Islands Regency during November-December 2023. Primary data in this study were obtained from research subjects (collected proportionally random), with the following inclusion criteria: (a) patients with type 2 DM, (b) domiciled in the research location, and (c) able to communicate with local and national languages well. Samples will be excluded if they meet the following criteria: (a) do not want to participate as research subjects, (b) are DM patients who use insulin injections, and (c) DM patients who take medication regularly.

Primary data were obtained through checking Current Blood Sugar (GDS) using the Nitro Premier S Blood Glucose Monitor (measurement range: 1-50 mmol / L) and filling out questionnaires containing questions about knowledge about DM, alternative treatment, family support, and types of meals. Data on the types of eating frequencies in this study were obtained using a sub-questionnaire in the form of Semi-Quantitative Food Frequency Quistionnare (SQ-FFQ).

The data obtained were then analyzed univariately, bivariately, and multivariately. Nutritional intake data is first processed with the Nutrisurvey program to determine the nutritional content consumed by respondents, to be subsequently compared with the Recommended Dietary Allowances (RDA) for Indonesia in 2019. Next, advanced analysis is carried out with SPSS. Nutritional adequacy is said to be less if the result is <80% RDA, and it is said to be sufficient if the result is ≥80% RDA.

RESULTS AND DISCUSSION

Results

This study has been conducted on 270 subjects. Preliminary findings revealed that the majority (70.4%) of respondents had uncontrolled blood glucose levels (Table 1). In detail, the findings were elaborated through the results of bivariate analysis (Table 2) which showed that the variables knowledge ($p = 0.000$), family support ($p = 0.000$), and frequency of eating ($p = 0.010$) were factors that were significantly associated with blood glucose levels. Further analysis of eating frequency, as visualized in Figure 1, revealed that there is a tendency for blood glucose to become difficult to recognize when a person rarely consumes the foods tested. The types of foods that contribute significantly to blood glucose levels, as the results of bivariate analysis (Table 3), include: yellow rice ($p = 0.004$), potatoes ($p = 0.036$), shellfish ($p = 0.042$), tofu (0.015), and apples ($p = 0.046$).

Table 1: Frequency Distribution of Blood Glucose Levels

Blood Glucose Level	n	%
Controlled	80	29,6
Uncontrolled	190	70,4
Total	**270**	**100**

Source: analyzed data (2023)

Table 2: Results of Bivariate Analysis

Variable	Category	Blood Glucose Level		Total (n)	*p-value*
		Uncontrolled (n)	Controlled (n)		
Knowledge	Less	85	16	101	0,000[a]
	Sufficient	105	64	169	
Types of treatment	Modern Medicine and Herbs	37	22	59	0,145[a]
	Modern Medicine	153	58	211	
Family support	Negative	107	20	127	0,000[a]
	Positive	83	60	143	
Carbohydrate intake	Sufficient	8	2	10	0,728[b]
	Less	182	78	260	
Protein intake	Less	176	77	253	0,264[a]
	Sufficient	14	3	17	
Fat intake	Sufficient	3	0	3	0,557[b]
	Less	187	80	267	
Fiber intake	Less	186	78	264	1,000[b]
	Sufficient	4	2	6	
Meal frequency	Less	61	39	100	0,010[a]
	Sufficient	129	41	170	
Total		**190**	**80**	**270**	

[a]Uji Chi-Square, [b]Uji Fisher's Exact Test

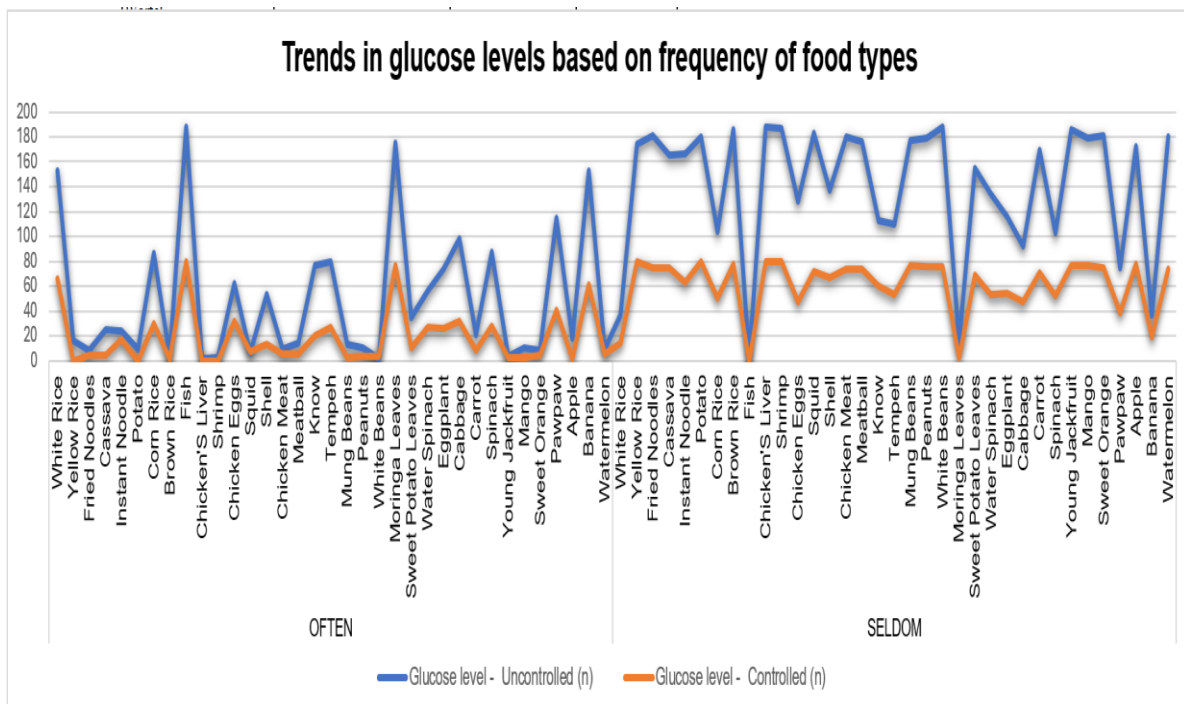Source: analisis data (2023)

Figure 1: Trends in glucose levels based on the frequency of food types

Table 3: Results of Bivariate Analysis (Type of Food)

No.	Types of Food	p-value	No.	Types of Food	p-value	No.	Types of Food	p-value
1	White Rice	0,705[a]	12	Chicken Eggs	0,246[a]	24	Kale	0,487[a]
2	Yellow Rice	0,004[b]	13	Squid	0,076[b]	25	Eggplant	0,316[a]
3	Fried Rice	0,564[b]	14	Shellfish	0,042[a]	26	Cabbage	0,082[a]
4	Cassava	0,099[a]	15	Chicken Meat	0,573[b]	27	Carrot	0,962[a]
5	Instant Noodle	0,072[a]	16	Meatball	0,970[a]	28	Spinach	0,102[a]
6	Potato	0,036[b]	17	Tofu	0,015[a]	29	Young Jackfruit	0,426[b]
7	Corn Rice	0,239[a]	18	Tempeh	0,200[a]	30	Manggo	0,764[b]
8	Brown Rice	1,000[b]	19	Green Beans	0,408[b]	31	Sweet Orang	0,564[b]
9	Fish	1,000[b]	20	Peanuts	1,000[b]	32	Papaya	0,159[a]
10	Chicken Offals	1,000[b]	21	White Beans	0,065[b]	33	Apple	0,046[a]
11	Shrimp	0,557[b]	22	Moringa Leaves	0,213[a]	34	Banana	0,429[a]
			23	Sweet Potatao Leaves	0,351[a]	35	Watermelon	0,573[b]

[a]Uji Chi-Square, [b]Uji Fisher's Exact Test

Source: primary data (2023)

Table 4: Multivariate Analysis Results

Variable	p-value	OR	95% C.I. for EXP (B)		R^2
			Lower	Upper	
Knowledge	0,000	3,526	1,867	6,661	
Family Support	0,000	4,316	2,299	8,103	
Types of Food					
Yellow Rice	0,998	4,319E8	0,000	0,0	0,305
Potato	0,998	0,000	0,000	0,0	
Tofu	0,004	0,378	0,194	0,734	
Constant	0,999	0,000			

*Uji Multivariate Logistic Binary

Source: primary data (2023)

Based on the results of multivariate analysis, knowledge (p = 0.000), family support (p = 0.000), and the type of tofu food (p = 0.004) did affect glucose levels. However, sequentially, family support was the most influential variable (4,316). The variable with the second largest influence was knowledge (3.526), and finally the kind of tofu food (0.378). The probability value if these three variables plus two counfounding variables (types of yellow rice and potato foods) together affect blood glucose levels is R2 = 0.305 (30.5%).

DISCUSSION

Fishman's research findings reveal that the quality of people with DM with a distinctive lifestyle has a lot of aspects and includes socio-cultural aspects and diet (Fishman et al., 2023). The findings of the study were confirmed in this study. The main finding of this study is that 70.4% of DM sufferers in Selayar Islands Regency have uncontrolled blood glucose levels because they are influenced by knowledge, family support, and type of food (tofu).

Given that diet is one of the important modifiable factors in dealing with DM; therefore, it is important to understand variations in food consumption patterns and socio-cultural variations of people (Sachdev & Misra, 2023). That way, the picture of public knowledge can be mapped and used as a reference to formulate policies in the health sector in the context of clinical practice (Bosun-Arije et al., 2019). In this study, the majority of subjects (n = 169 or 62.6%) had sufficient knowledge.

Only diabetics whose less knowledge experience that had uncontrolled glucose levels. This conclusion can be verified through the results of chi-square testing in bivariate analysis. Likewise, the results of a multivariate analysis confirm the statement that the knowledge of DM sufferers does affect blood glucose levels. This knowledge in turn increases awareness and controls the behavior of DM sufferers (Afrasiabi et al., 2022). The behavior in question can be in the form of compliance with health control, discipline in diet, and utilization of health information provided by health professionals (doctors, nurses, and other health workers) (Muliyil et al., 2017).

In the case of this study, the sufficient knowledge on the subjects was due to the characteristics of DM sufferers who were outpatients at the health center. The routine situation of medical check-ups in outpatients causes access to health information is easily accessible and always updated regularly (Haskani et al., 2022). As confirmed in Ahmed's research (Ahmed et al., 2024), increasing knowledge about nutrition is very helpful for people with DM to organize self-management proportionally. The process of development on the knowledge factor is different from the family support factor.

In this study, 143 people (53%) received positive family support. Bivariate analysis of this study revealed that apparently uncontrolled glucose levels tended to occur in DM sufferers whose family support was negative (84.3%). This conclusion is also reinforced by the results of chi-square testing and multivariate analysis. When examined further by comparison to the findings of other studies (Kangmennaang et al., 2023; Shahroodi et al., 2022), family support is not much different from social support outside the family environment. Family support for DM sufferers (meaning positive support), viewed from a psychosocial perspective, acts more as an agent that increases the compliance of diabetic patients with the rule of thumb self-management of DM sufferers.

According to research by Kumar & Mohammadnezhad (2022), this happens because the family is the closest person to the patient as well as the most responsible for caring the DM sufferers while at home. That is, the family also serves as the main support system to accompany and ensure that people with DM undergo their procedures and treatment schedules in an orderly manner. In addition to this study, the contribution of family support was also seen in cases in other regions, for example in America (Benavides-Vaello & Brown, 2016).

There, the family plays a role in identifying problems, making decisions, caring for family members, and modifying the environment and food menu. In other words, the family is a resource that provides external motivation (Setyoadi et al., 2023). Family support does not have a direct effect on blood sugar control, rather it only helps patients control it. Thus DM patients can apply self-management holistically (Dewi et al., 2023; Tran & Tran, 2022).

The implication, of course, is that they can control weight and symptoms of obesity as occurs in DM sufferers in Malaysia (Jan Mohamed et al., 2015). Moreover, people with DM also pay attention to the type of food consumed (Fathonah et al., 2021).

According to the results of chi-square testing in this study, there are five types of foods associated with blood glucose levels, namely yellow rice, potatoes, shellfish, tofu, and apples. Even so, multivariate analysis shows that only knowing actually has an influence on blood glucose levels in people with DM.

As part of Indonesian society, the people of Selayar Islands do have a carbohydrate-based diet. This diet is almost the same as the diet of people in other Asian regions, who sometimes have difficulty transitioning food supplies [20]. However, different types of carbohydrate sources can have different influences on blood sugar. For example, brown rice and corn rice. Brown rice and corn rice are effective in lowering blood sugar levels in patients with type 2 diabetes (Fauziah et al., 2021).

Specifically in this study, tofu has an influence on blood glucose levels. Tofu has a low glycemic index, which is 15 (Glycemic Index Guide, 2024), so it is suitable for consumption by people with DM because it does not cause the secretion of large amounts of insulin as a result of high and rapid increases in blood sugar levels (Amiruddin et al., 2019). Any multivariate analysis in this study yielded an OR<1 value. That is, consuming tofu with infrequent frequency can be a protective factor against uncontrolled blood glucose levels.

Both types of tofu food, family support, and nutritional knowledge of people with DM, are basically manifestations of sub-sub-variables of the socio-cultural conditions of the community, which in turn also regulate how people with DM and those around them think and act (Han et al., 2020). For, as Drozd (2000) points out, culture influences the way people think and behave with respect to health and disease. Because of cultural differences, professionals and patients may have very different perspectives on how to interpret DM, explain its causes and progression, understand its symptoms, and decide on treatment procedures.

CONCLUSION

This study revealed that judging from the socio-cultural conditions and diet of DM sufferers in Selayar Islands, there are three factors that affect blood glucose levels. The three factors include knowledge, family support, and type of food. Therefore, professionals or practitioners providing health facilities need to rearrange priorities to reduce blood glucose levels for people with DM.

The priority program in question, for example, is to educate the public about DM mitigation (potential and risk), strengthening family roles, and standardizing and classifying food supplies. In addition to being rehabilitative by controlling blood sugar levels, these priority programs are also preventive against the emergence of new sufferers.

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