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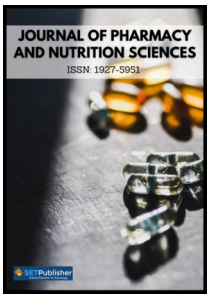

The Cross-Sectional Study of Self Efficacy, Diet Compliance, and Blood Sugar Levels on Diabetes Mellitus Patients in Indonesia

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Abstract:

Diabetes mellitus (DM) has become a global health problem because the prevalence of diabetes mellitus continues to increase. Data from the West Sumatra Provincial Health Office (2018), DM cases totalled 44,280 cases, with a DM prevalence of 1.6% in 2018. Self-efficacy plays an important role in controlling blood sugar levels. Lack of self-efficacy causes the patient's blood sugar levels to become abnormal, resulting in a risk of complications. This research aims to study the relationship between self-efficacy and diet compliance with blood sugar levels in DM patients at the Andalas Public Health Center, Padang City. The research method is descriptive-analytic with a cross-sectional approach, with a total sample of 75 people. The results showed that 78.7% of the respondents have hyperglycemia, 72.0% with non-compliant to their diet limitation, and 68.0% with low self-efficacy. A relationship exists between diet compliance and blood sugar levels in type 2 DM patients. There is a relationship between self-efficacy and blood sugar levels in type 2 diabetes mellitus patients at the Padang Andalas Public Health Center in 2022.

INTRODUCTION

Diabetes mellitus (DM) has become a global health problem because the prevalence of DM continues to increase in developed and developing countries [1]. DM keep increasing every year and becomes a threat to world health. According to the 2018 Indonesian Basic Health Research results, the proportion of the population ≥15 years with Type 2 DM increased from 2013 by 1.5% to 2% in 2018 while the prevalence of DM based on blood sugar examination increased from 6.9% to 8.5%. According to the data from the West Sumatra Provincial Health Office (2018), the number of DM cases in West Sumatra totaled 44,280. West Sumatra had a DM prevalence of 1.6% in 2018. West Sumatra had a DM prevalence of 1.6% in 2018 [2].

DM has the highest number of outpatients compared to other degenerative diseases. DM is caused by the patient's insulin hormone being insufficient or cannot work normally [3]. The insulin hormone has a major role in regulating blood sugar (glucose) levels. Self-efficacy plays an important role in controlling blood sugar levels for people with DM. When self-efficacy is lacking, the patient's blood sugar levels become abnormal, resulting in a risk of complications [4].

Patients with high self-efficacy have better blood sugar control than those with low self-efficacy [5]. Diet is one of the important factors in the management of diabetes mellitus because it aims to achieve or maintain blood glucose and lipid levels close to normal, achieve and maintain body weight within normal limits, prevent acute and chronic complications, and improve quality of life. Diet compliance is also one of the keys to success in the management of DM [6].

This study aimed to study the relationship between self-efficacy and dietary compliance with blood sugar levels in DM patients at Andalas Health Center, Padang, Indonesia.

RESEARCH METHODS

This research method is descriptive-analytic with a cross-sectional approach. This research was conducted in September 2022 at the Andalas Health Center in Padang City Indonesia. The population was all DM patients recorded at the Andalas Health Center. The sampling technique used was total sampling with a total sample of 75 people. Data analysis used chi-square with a significance of $p < 0.05$. Data collection was carried out using interview techniques and examining blood sugar levels. The measured blood sugar level was the blood sugar level when using the glucocheck tool. Self-efficacy was measured by the Diabetes Management Self-Efficacy Scale (DMSES), which consists of 20 items that are summed using a 5-point Likert scale to measure perceived self-efficacy for controlling DM, including self-efficacy for dieting, physical activity exercise, measuring blood sugar levels, foot care, and medication. Diet compliance was measured using a DM diet compliance questionnaire, including adherence to the type, amount, and schedule of meals.

RESULTS AND DISCUSSION

1. Univariate Analysis

a. Blood Sugar Levels

Based on Table **1**, it was found that more than half of the 75 respondents, i.e. 59 respondents were (78.7%) with hyperglycemia at the Padang Andalas Health Center in 2022.

Table 1: Frequency Distribution of Respondents Based on Blood Sugar Levels on Type 2 Diabetes Mellitus Patients at Padang Andalas Health Center in 2022

Blood Sugar Levels	F	%
Normal	16	21.3
Hyperglycemia	59	78.7
Total	75	100.0

Increased blood sugar levels in the body are one of the hallmarks of type 2 diabetes mellitus (DM) [7]. Whether the blood sugar levels are controlled in the body or not, can be found by checking blood sugar levels. An increase in random blood sugar (random glucose testing measures the level of glucose in the blood at any given point in the day) levels, ≥ 200 mg/dl, accompanied by symptoms of polyuria, polydipsia, polyphagia, and unexplained weight loss, is sufficient to establish a diagnosis of DM.

The researchers assumed that many of the respondents participating in the research had hyperglycemia which was more than half of the respondents. The questionnaire results supported it, out of 75 respondents 59 people (78.7%) with hyperglycemia, and 16 people (21.3%) with normal blood sugar levels. The study results were based on

gender characteristics; most of the respondents who suffered from type 2 DM were women, as many as 56.0% of respondents. Fat accumulation cause insulin resistance. It is inhibiting insulin action in the body tissues and muscles. It can cause glucose not to be lifted into the cells, therefore increasing glucose levels in the blood [8].

Based on age, the majority of respondents aged 51-60 years, 45.3% of respondents, age is also associated with the risk of increasing blood glucose levels. With increasing age, the ability of tissues to take up blood glucose will decrease [9].

Based on job characteristics, many of the respondents were housewives, 40.0% of respondents, and retirees. Based on the results of interviews 13.3% of respondents, tend to have less physical activity, which affects the increase in insulin [10]. The amount of insulin that is not sufficient to meet the needs or to convert glucose into energy will result in disturbances in the control of glucose in the blood, which triggers type 2 DM [11].

b. Diet Compliance

Based on Table **2**, it was found that out of 75 respondents, more than half of the respondents, which were 54 people (72.0%), did not comply with the diet of type 2 DM patients.

Table 2: Frequency Distribution of Respondents Based on Diet compliance with Blood Sugar Levels in Type 2 Diabetes Mellitus Patients at Padang Andalas Health Center in 2022

Diet compliance	F	%
Compliant	21	28.0
Non-compliant	54	72.0
Total	75	100.0

Diet compliance is important in maintaining blood sugar levels at normal [12]. The basis of the DM diet is to provide sufficient calories by paying attention to the amount, schedule, and type of food given. The principle of diet for people with DM is almost the same as the food recommendations for the general public: balanced food according to each individual's calorie and nutrient needs [13]. 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 [14].

Researchers assume that the level of education can affect knowledge about adherence to a DM diet [15]. More than half of the respondents, namely 54 people (72.0%), did not adhere to the DM diet. Based on the characteristics, respondents' level of education was low (90.7%) and higher education (9.3%). From this, it can be seen that many of the respondents with low education still lack knowledge of diet implementation [16]. Based on the results of interviews with non-compliant respondents, they tended to complain because the foods listed on the diet menu list were less varied, and they had limited foods from carbohydrate and fat groups.

However, it must be noted that there were also respondents with higher education who ignored health. Based on the results of interviews with respondents, it was found that several respondents with higher education paid little attention to their health for several reasons, one of which was related to work and high activity, causing respondents to have an irregular lifestyle and bad eating pattern due to difficulties in adjusting diet limitation and work [17]. Individuals with busy activities often have unscheduled eating patterns, fast food and snacks.

c. Self Efficacy

Based on Table **3**, it was found that more than half of the 75 respondents, 51 respondents (68.0%) were with low self-efficacy.

Table 3: Frequency Distribution of Respondents Based on Self Efficacy with Blood Sugar Levels in Type 2 Diabetes Mellitus Patients at Padang Andalas Health Center in 2022

Self Efficacy	F	%
High	24	32.0
Low	51	68.0
Total	75	100.0

Self-efficacy is the result of cognitive processes in the form of decisions and beliefs about the extent to which individuals estimate their ability to carry out certain actions independently, in this case, the treatment of diabetes mellitus in general, especially in controlling blood sugar levels [5]. Self-efficacy in diabetes mellitus patients focuses on the patient's belief in being able to carry out lifestyle changes that can improve their disease and self-care management, such as diet, physical exercise, drug therapy, blood sugar control, and diabetes mellitus treatment in general [18].

Researchers assume that everyone has different levels of self-efficacy despite facing the same problem. It is influenced by education and work [19]. Low education decreases the likelihood of getting maximum benefits from the information provided [20]. Contrary to this, high education makes it easier for a better understanding. The next factor is work; based on the job characteristics of the respondents, it shows that most of the respondents are homemakers, as many as 40.0% of respondents. Working as a house wife makes them spend much time at home, limiting their socializing and physical approach to information. The study revealed that the levels of respondents' financial dependency on earning member of the family also affected the respondents' capability to utilize health facilities (tambahkan referensi No 21 di Mendeley Buk krn kehapus, ocha gak punya Mendeley di laptop).

Bivariate Analysis

a. The Relationship between Diet Compliance and Blood Sugar Levels

Based on Table **4**, it can be seen that most of hyperglycemia respondents, (92.6%) with type 2 diabetes mellitus were non-compliant with diet, compared to those with diet compliance, 42.9%.

Based on the statistical test results using the Chi-Square formula, it was gained the p-value = 0.000 (p <0.05), meaning that there is a relationship between diet compliance and blood sugar levels in Type 2 Diabetes Mellitus Patients in this study.

High blood sugar levels that are not controlled are caused by various influencing factors, including patient awareness in carrying out a less compliant diet program, patient knowledge of blood sugar control is still low due to a lack of obtaining information about blood sugar control / DM management and due to the low awareness of living a healthy lifestyle [22].

The researchers assume that there is a relationship between diet compliance and blood sugar levels due to the diet suggested to the respondents. Based on the questionnaire results, respondents with compliant diet compliance with normal blood sugar levels as many as 12 people (57.1%) of respondents because, based on interviews, respondents followed the rules. They obeyed the eating rules to get optimal metabolic control, namely blood sugar levels. Respondents could control eating patterns well, such as the amount, schedule, and type of food eaten and time management in diet arrangements. In carrying out the DM diet, respondents also regularly take type 2 diabetes mellitus medication which is carried out together with physical activity so that they can control blood sugar levels in the body properly [16].

For diet compliant respondents with hyperglycemia, 9 people (42.9%) of respondents, there may be other factors that affect the increase in blood sugar levels of respondents. One of them is stress. Stress increases levels of the hormone cortisol. The increase in cortisol will trigger the breakdown of blood sugar [23] causing hyperglycemia. 4 respondents (7.4%) did not comply with normal blood sugar levels. It could be due to other factors such as physical activity. Physical activity is key in managing diabetes mellitus. Based on interviews, respondents said that they were diet compliant only when their blood sugar levels are high. However, respondents often do physical activities such as aerobics, leisurely walking and doing homework, so that when someone is physically active, it will reduce insulin resistance and will ultimately lower blood sugar levels.

Based on respondents who did not comply with hyperglycemia, as many as 50 respondents (92.6%), this occurred because most respondents had not implemented the 3J rules, namely the amount of food, type of food, and food schedule. The results of the questionnaire interview, some respondents often consume high-sugar foods such as cakes and drink coffee or tea using granulated sugar. The patient's lack of motivation also influences the patient's non-

Table 4: The Relationship between Diet Compliance and Blood Sugar Levels in Type 2 Diabetes Mellitus Patients at Padang Andalas Health Center in 2022

Diet Compliance	Blood Sugar Levels				Total		P Value
	Normal		Hyperglycemia				
	F	%	f	%	f	%	
Compliant	12	57,1	9	42,9	21	100	0,000
Non-compliant	4	7,4	50	92,6	54	100	
Total	16	21,3	59	78,7	75	100	

compliance with the diet. Patients tend to feel lazy and bored with the diabetes mellitus menu, according to the rules.

Thus, DM patient compliance is important in carrying out the dietary rules; respondents who comply in carrying out the diet program correctly will be able to minimize changes in blood sugar levels within normal limits [24]. Vice versa, if the respondent is not obedient in carrying out the diet program, the respondent will get a change in sugar levels above normal.

b. The Relationship between Self Efficacy and Blood Sugar Levels

Table **5** shows that hyperglycemia respondents in type 2 diabetes mellitus patients were found more in respondents with low self-efficacy, namely 48 people (94.1%), compared to high self-efficacy, namely 11 people (45.8%).

Based on the results of statistical tests using the Chi-Square formula, it was gained the p-value = 0.000 (p <0.05), meaning that there is a relationship between self-efficacy and blood sugar levels in Type 2 DM Patients at Padang Andalas Health Center in 2022.

Self-efficacy gives individuals the confidence to carry out the desired behaviour, namely maintaining normal blood sugar levels. It causes DM patients to carry out behaviours that can support and improve self-care management, such as diet, physical exercise, drug therapy, blood sugar control, and diabetes mellitus treatment. Low efficacy makes DM patients feel helpless in treating DM, which will certainly increase their blood sugar levels.

Researchers assume that there is a relationship between self-efficacy and blood sugar levels because self-efficacy has a very important role in changing one's health behaviour, especially in managing DM, especially in controlling blood sugar levels [5]. Based on the results of the questionnaire, there were respondents with high self-efficacy with normal blood sugar levels as many as 13 respondents (54.2%) because they were able to maintain and check their blood sugar if necessary, correct their blood sugar when blood sugar results were high, able to choose right eating, check the condition of the feet if there are skin disorders or wounds, adjust food when they are sick, follow healthy eating rules, exercise, adjust the eating plan when exercising, and follow a healthy diet. Besides, they can follow adjustments to meal plans, manage and take medication as prescribed and make medication adjustments when sick. Good self-efficacy will help type 2 diabetes patients achieve normal blood sugar levels. Hence, they are more confident in managing the disease to prevent complications caused by DM [25].

There were 11 respondents (45.8%) with high self-efficacy with hyperglycemia, It happened since the respondents believe they can maximize themselves in controlling their blood sugar levels regularly, but they do not comply with other DM therapies such as irregular eating patterns, living an unhealthy lifestyle, and not adhering to taking medication. Therefore, good self-efficacy gives a person the potential to pay attention to other health; someone with less self-efficacy can cause blood sugar levels to become abnormal, resulting in the risk of complications.

There were 3 respondents (5.9%) with low self-efficacy with normal blood sugar levels. It occurred because the respondents were not sure they could maximize themselves in controlling their blood sugar levels. However, they complied with other DM treatments such as doing physical activity, living a healthy lifestyle, being obedient to taking medication and having regular health checks at the health centre. Someone unsure of himself tends to ignore good health, so he pays less attention to self-care, especially maintaining blood sugar levels. Thus, he is at risk of poor health.

As many as 48 respondents (94.1%) with hyperglycemia whose self-efficacy was low. In respondents who have low self-efficacy regarding their

Table 5: The Relationship between Self Efficacy and Blood Sugar Levels in Type 2 Diabetes Mellitus Patients

Self Efficacy	Blood Sugar Levels				Total		P Value
	Normal		Hyperglycemia				
	f	%	f	%	f	%	
High	13	54,2	11	45,8	24	100	0,000
Low	3	5,9	48	94,1	51	100	
Total	16	21,3	59	78,7	75	100	

abilities to be able to control their condition, it happened because when interviewed, they said they were resigned to their condition and preferred to carry out a lifestyle that was built as usual and only depended on regular checking of blood sugar levels as well as regular medical checking at the Public Health Center. Respondents who have low self-efficacy will lower their self-confidence and motivation, so they are at risk of depression. The level of self-efficacy that continues to decrease will exacerbate individual involvement in diabetes treatment, thereby increasing the risk of acute and chronic complications.

CONCLUSION

There are more than half of the respondents, 59 people (78.7%) with hyperglycemia, 54 respondents (72.0%) with non-compliant diet compliance, and 51 respondents (68.0%) with low self-efficacy. A relationship exists between diet compliance and blood sugar levels in type 2 DM patients. There is a relationship between self-efficacy and blood sugar levels in type 2 diabetes mellitus patients at the Padang Andalas Health Center in 2022.

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