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Implementation of Educational Support and Its' Related Factors Associated with Random Blood Sugar among Type 2 Diabetes Mellitus Patients During Covid-19 Pandemic

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Abstract. Background: Effective strategies in preventing type 2 diabetes mellitus and complications such as educational support, multidisciplinary management, strict monitoring, and prevention such as foot care; **Objective**: This study aimed to determine the relationship between the implementation of the educational support and its' related factor with random blood sugar control in type 2 Diabetes Mellitus patients during the Covid-19 Pandemic. **Method**: The retrospective cohort was applied in this study. The sampling technique in this study was non-probability sampling with a purposive sampling approach, and the number of samples in this study was 40 people. **Results**: There is a relationship between the implementation of educational support and random blood sugar control with **ρ**=0.007 an OR value of 9,67, there is a relationship between age and random blood sugar control with **ρ**=0.017 an OR value of 9,0; there is a relationship between the length of suffering from DM and random blood sugar control with **ρ**=0.018 an OR value of 7,0; there is no relationship between obesity and random blood sugar control with **ρ**=1.000 an OR value of 1,0, and there is no relationship between genetic and random blood sugar control with **ρ**=0.479 an OR value of 1,8. **Conclusion** there is a relationship between the implementation of educative support, age, and length of suffering from diabetes mellitus with random blood sugar control.

Keywords: type 2 diabetes mellitus, educational support, risk factors, random blood sugar control

BACKGROUND

Diabetes Mellitus (DM) is a chronic metabolic disease, which has emerged as a public health problem. In Indonesia, the number of adults with diabetes is estimated to increase from 6.9 million in 2010 to 12 million in 2030 (1-2). Diabetes Mellitus (DM) is an established risk factor for several causes of death, including ischemic heart disease, stroke, kidney disease, infectious diseases, and several cancers (3).

WHO predicts the increase of Diabetes Mellitus cases in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030. Meanwhile, the International Diabetes Federation (IDF) predicts it will increase from 9.1 million in 2014 to 14.1 million in 2035 (4). Approximately 79 million people have blood glucose levels in the diabetes risk category, and more than 100 million Americans are at risk for the devastating complications of diabetes (5)

Risks 2018 showed the increase of Diabetes Mellitus cases from 6.9% in 2013 to 10.9% in 2018. South Sulawesi was ranked 16th out of 34 Provinces in Indonesia. Complications of diabetes mellitus can be acute or chronic. A total of 1785 people with diabetes mellitus in Indonesia experienced complications: 16% of patients with diabetes mellitus had macrovascular complications, 27.6% microvascular complications, 63.5% had neuropathy, 42% diabetic retinopathy, and 7.3% nephropathy (1).

The prevalence of diabetes Mellitus will continue to increase every year, and data from the International Diabetes Federation shows that the number of patients diagnosed with Diabetes Mellitus in Indonesia is estimated to grow from 10.3 million in 2017 to 16.7 million in 2045 (6). Of these figures, only 14.3% met the target of HbA1c level (7). A Higher HbA1c level of more than 8% is considered as poor glycemic control (8).

The incidence and prevalence of diabetes worldwide are now increasing exponentially. In addition, one major complication of diabetes Mellitus is Diabetic Foot Ulcers (DFU), which raised very high. The reported prevalence of DFU is 12% in Indonesia, and more than half have DFU risk factors (9). This fact demonstrates the importance of prevention strategies, especially in a community setting. Several factors are associated with uncontrolled glycemic type 2 Diabetes Mellitus, including unhealthy eating habits, physical inactivity, non-adherence to medication, lack of regular home glucose monitoring (10).

The results showed that the five-week Support Management Program was effective. Thus, nurses are recommended to implement this program in preventing diabetic foot ulcers by controlling blood sugar (11). The Covid-19 pandemic requires staying at home, thus making the condition of people with Diabetes Mellitus even worse due to limited physical activity and excessive food intake due to staying at home without other activities, which can trigger complications.

Strategies to prevent ulcers and further complications in patients with Diabetes Mellitus are educational support for patients, multidisciplinary management, strict monitoring, and precautions with foot care. Education to patients is needed as the first step in controlling type 2 Diabetes Mellitus to improve knowledge and skills (12).

Several studies about Diabetes mellitus, which only focus on HbA1C control, and none of the studies about the implementation of educational support in the health care setting, especially in the COVID-19 pandemic. Thus, researchers consider it necessary to improve glycemic control and quality of life in diabetes mellitus patients.

This research will determine the relationship between the implementation of the educational support and risk factors with random blood sugar control in type 2 Diabetes Mellitus patients during the Covid-19 Pandemic in Takalar city.

METHOD

Design

The type of research used was descriptive and analytical research. The research method used was the

observational method with a prospective research design. The history of educational support implementation and risk factors for type 2 diabetes mellitus will be traced, which cause ulcers in type 2 DM patients.

Sample size and sampling technique

The sampling technique was non-probability with a purposive sampling approach. The number of samples in this study was 40 people according to the inclusion and exclusion criteria. The inclusion criteria are type 2 DM patients, no foot ulcers, living with family, actively checking themselves into health services, and being willing to be respondents. The exclusion criteria are patients with drastic health declines during the study. The patient was not present at the site when the study took place. The patient suffered from diabetic ulcers and gangrene, who have physical, mental, or cognitive limitations that may interfere (blind, deaf, mentally disabled) and are confirmed to have COVID-19.

Data collection instrument

The research instrument used in this study was a questionnaire as a data collection tool and observation sheets. The questionnaire contained a well-structured list of statements, and respondents only provided answers or signs. Questionnaire A had the characteristics of respondents include age, gender, education, occupation, income, obesity status, genetics, and duration of suffering Diabetes Mellitus. Questionnaire B contained the implementation of educational support, where the instrument contents are diet, physical activity, and medication, then measured using a Likert scale.

The validity test used the Pearson product-moment correlation technique with a significant level of 0.05. The measurement of each question item from the questionnaire by comparing the r count is more critical than the r table. If the r count is greater than the r table, the statement in the questionnaire is valid, but if the r count is less than the r table, then the questionnaire is invalid.

Validity and reliability testing

Reliability showed that the measurement results remained consistent or essential when two or more measurements were made in the same indications using the same measuring instrument. The reliability test was carried out by comparing the Cronbach alpha value of 0.05. If Cronbach's alpha is greater than or equal to alpha, the statement in the questionnaire is declared reliable.

Regarding the respondent's approval process, the researcher observed or asked about the history of diet, physical activity, medication, and risk factors for DM in the last three months. Then delivering the educational support materials related to the prevention of complications of DM and the identity of the respondents was kept confidential.

Statistically analysis

In this study, respondents' characteristic variables were analyzed using descriptive statistics. The data collection results are processed using the SPSS version 24 program and presented in tabular form with explanations. Data analysis was carried out using statistical correlation tests with the value of significance degree was $p \leq 0.05$. If the probability is less than $p \leq 0.05$, Ho is rejected, and Ha is accepted, showing a significant relationship between the dependent and independent variables.

RESULT

Data demographic

Table 1 shows that the majority of respondents' gender was female (77.5%). Based on the level of education, most respondents' education is advanced as many as 20 respondents (50.0%), and primary education as many as 20 respondents (50.0%). The majority of respondents' occupations are farmers, as many as 16 respondents (40.0%), entrepreneurs as many as 10 respondents (25.0%), Civil servants as many as 3 respondents (7.5%). Housewives as many as 5 respondents (12.5%), not working as

many as 5 respondents (12.5%), and 1 respondent who works as a private employee (2.5%). Meanwhile, based on the socioeconomic status of respondents who have socioeconomic status ≥ Rp. 1.200.000 as many as 23 respondents (57.5%) and who have socioeconomic status < Rp. 1.200.000 as many as 17 respondents (42,5%)

Table 1. Data demographic

Characteristics of respondents	Total	
	n	%
Gender		
Male	9	22.5
Female	31	77.5
Education		
Basic Education	20	50.0
Advance Education	20	50.0
Occupation		
Not Working	5	12.5
Farmer	16	40.0
Entrepreneur	10	25.0
Private employee	1	2.5
Civil Servant	3	7.5
House Wife	5	12.5
Sosio-economic		
≥ 1.200.000 (IDR)	23	57.5
< 1.200.000 (IDR)	17	42.5
Total	40	100%

Table 2 shows that the age of respondents with type 2 Diabetes Mellitus is the majority age < 60 years old as many as 35 Respondents (87.5%). The majority of the length of suffering from type 2 Diabetes Mellitus is < 10 years as many as 32 respondents (80.0%). For obesity, most respondents are not obese, as many as 30 respondents (75.0%). Meanwhile, based on genetics, the majority is non-hereditary, with as many as 29 respondents (72.5%).

Table 2. distribution of respondents based on age, length of suffering from Diabetes Mellitus, obesity, and genetics

Characteristic of Respondent	Total	
	n	%
Age		
< 60 Years old	35	87.5
≥ 60 Years old	5	12.5
length of suffering Diabetes Mellitus	32	80.0
< 10 years	8	20.0
≥ 10 years		
Obesity		
Not Obese	30	75.0
Obese	10	25.0
Genetic		
Nonheredity	29	72.5
Heredity	11	27.5
Total	40	100%

Table 3 shows that the majority of the implementation of educational support for respondents with type 2 Diabetes Mellitus is implemented by 33 respondents (82.5%) while the 7 respondents (17.5%) are not implemented.

Table 3. Frequency distribution of respondents based on the implementation of educational support

The implementation of Educational Support	Total	
	n	%
Implemented	33	82.5
Not Implemented	7	17.5
Total	40	100%

Table 4 shows that most respondents' random blood sugar control in patients with type 2 Diabetes Mellitus is reasonable, as many as 32 respondents (80.0%). At the same time, the control of random blood sugar is less as many as 8 respondents (20.0%).

Table 4. Distribution of on Random Blood Sugar Control among Type 2 Diabetes Mellitus Patients during the Covid-19 Pandemic

Random Blood Sugar Control	Total	
	n	%
Good	32	80.0
Less	8	20.0
Total	40	100%

Table 5 shows that there is the implementation of educational support with Random Blood Sugar Control (ρ=0.007) with the OR value of 9.67, age with Random Blood Sugar Control (ρ=0.017) with the OR value of 9.0, duration of suffering Diabetes Mellitus with Random Blood Sugar Control (ρ=0.018) with the OR value of 7.0. There

is no relationship between obesity and random blood sugar control (ρ=1,000) with the OR value of 1.0, and genetics with random blood sugar control (ρ=0.479) with the OR value of 1.8.

to replace insulin or improve insulin sensitivity, and monitors blood glucose levels to modify diet, exercise, and drug use as appropriate. (14) (15).

Table 5. The relationship between educational support and its' related factors with random blood sugar control in type 2 diabetes mellitus

Variable	Random Blood Sugar Control						P-Value	OR Value
	Good		Less		Total			
	n	%	n	%	n	%		
Implementation of Educational Support								
Implemented	29	72.5	4	10.0	33	82.5	0.007*	9,67
Not implemented	3	7.5	4	10.0	7	17.5		
Age								
< 60 Years old	30	75.0	5	12.5	35	87.5	0.017*	9,0
≥ 60 Years old	2	5.0	3	7.5	5	12.5		
Duration of suffering DM								
< 10 Years	28	70.0	4	10.0	32	80.0	0.018*	7,0
≥ 10 Years	4	10.0	4	10.0	8	20.0		
Obesity status								
Not Obesity	24	60.0	6	15.0	30	75.0	1.000*	1,0
Obesity	8	20.0	2	5.0	10	25.0		
Genetic								
Non-Hereditary	24	60.0	5	12.5	29	72.5	0.479*	1,8
Heredity	8	20.0	3	7.5	11	27.5		

DISCUSSION

This research shows the relationship between the implementation of educational support and Random Blood Sugar Control in Type 2 Diabetes Mellitus Patients during the Covid-19 Pandemic in Takalar. Education is conveyed for improving the patient's knowledge and skills to have preventive behavior in their lifestyle to avoid long-term complications of type 2 diabetes mellitus (12). Another research conducted (13) stated that DSME supports self-management of patients with type 2 diabetes mellitus in the short term covering aspects of knowledge, frequency, and accuracy of self-monitoring of blood glucose, diet management, and glycemic control. Optimal self-care behaviors include a healthy and balanced diet to maintain blood glucose levels within the normal range.

Physical activity increases the use of glucose by tissues, follows drug treatment

Risk factors that influence the occurrence of type 2 diabetes mellitus include: Genetic, Age, Obesity, Physical Activity, Diet, stress, Has been identified as impaired glucose tolerance (TGT) or impaired fasting blood sugar (GDPT), History of Gestational Diabetes (16) (17).

This research shows a significant relationship between age and random blood sugar control in type 2 diabetes mellitus patients during the Covid-19 pandemic in Takalar. Betteng & Mayulu (2014) said that a person ≥ 45 years old has an increased risk of developing Diabetes Mellitus. People with diabetes at the age ≥ 60 years, three times more than those aged < 55 years. Other research conducted (18) showed a relationship between age and diabetes self-care. It stated that younger ages were more likely to be lazy to do the physical activity than older patients.

This research shows the relationship between the length of suffering from

Diabetes Mellitus with Random Blood Sugar Control in Type 2 Diabetes Mellitus Patients during the Covid-19 Pandemic in Takalar. Research conducted (1) in *The Diab Care Asia 2008 study-Outcome on control and complications of type 2 diabetic patients in* Indonesia shows that the length of suffering from diabetes mellitus is more than five years to less than ten years. Research (19) states that the long-suffering from diabetes Mellitus harms the patient's quality of life, which shows a low energy rate.

This research shows no relationship between obesity and current blood sugar control in type 2 diabetes mellitus patients during the Covid-19 pandemic in Takalar. In addition, according to Kelly *et al*. (2008), the Epidemiology of type 2 diabetes mellitus is associated with rates of overweight and obesity in adults and youth. The prevalence of overweight (BMI 25-30 kg / m2) worldwide is predicted to increase from 33% in 2005 to 57.8% in 2030. Other research conducted (20-21). The prevalence of obesity based on waist circumference is 35%, in men, waist circumference 90 cm is 27.5%, and in women, with waist circumference, 80 cm is 43.4%. Obesity is a risk factor that will lead to type 2 Diabetes Mellitus. However, obesity does not necessarily cause ulcers. The research results showed no relationship between obesity and random blood sugar control in patients with type 2 diabetes mellitus.

The result also shows no relationship between genetics and Random Blood Sugar Control in Type 2 Diabetes Mellitus Patients during the Covid-19 Pandemic in Takalar. Research result (22) stated that a family history of diabetes had a 25 times greater risk of developing type 2 diabetes mellitus. Genetics is a factor that affects the occurrence of type II Diabetes Mellitus in respondents. Still, genetics does not necessarily cause ulcers because genetics is a risk factor for Diabetes Mellitus. People with type 2 diabetes mellitus will pass on to their children with a 15-30% chance of developing glucose intolerance (the inability to metabolize carbohydrates normally) (23).

CONCLUSIONS AND SUGGESTIONS

This study concludes a relationship between the implementation of educational support, age, and length of suffering from Diabetes Mellitus and Random Blood Sugar Control in Type 2 Diabetes Mellitus Patients during the Covid-19 Pandemic in Takalar city. There is no relationship between obesity and genetics with random blood sugar control in type 2 diabetes mellitus patients during the Covid-19 pandemic in Takalar city. The need for policies and attention from local and central governments to tackle the problem of diabetes Mellitus during the pandemic and collaboration between disciplines and explore the potential of the community in improving health and reducing the incidence of complications in people with Diabetes Mellitus.

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