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The Influence of the Four Pillars of Diabetes Mellitus Control on Complications in Diabetes Mellitus Patients

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ABSTRACT

There needs to be an effort in the management of Diabetes mellitus to keep blood sugar levels as close to normal as possible to prevent complications. Diabetes mellitus control can be done through four pillars, namely education, medical nutrition therapy, physical exercise, and pharmacological intervention. According to data from the District Health Office. Ciamis in 2019 there were 305 people suffering from diabetes mellitus in Kawali sub-district. The purpose of the study was to determine the effect of the four pillars of diabetes mellitus control on the incidence of complications in people with diabetes mellitus in Kawali sub-district, Ciamis district. This research is a descriptive-analytic study using a cross-sectional approach. Samples were taken using the purposive sampling method as many as 30 respondents. Data were collected using questionnaires and observation sheets. Data analysis used the Chi-Square test with a 95% confidence level (α=0.05). The results showed that 83% of respondents had a good level of education, 60% had appropriate medical nutrition therapy settings, 60% did not do physical exercise, and 66.7% adhered to pharmacological interventions. The results of statistical tests showed that there was a relationship between the pillars of education, medical nutrition therapy, and pharmacological intervention with the incidence of complications in people with diabetes mellitus in Kawali sub-district, Ciamis district (ρ-value < 0.05). There is no relationship between physical exercise and the incidence of complications in people with diabetes mellitus in Kawali sub-district, Ciamis district (ρ-value > 0.05).

Keywords: Four Pillars, Diabetes Mellitus, Complication.

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Introduction

Non-communicable diseases are two of the ten leading causes of death. The prevalence of non-communicable diseases tends to fluctuate. Diabetes mellitus is a non-communicable disease whose prevalence continues to increase (Putri, N. H. K., & Isfandiari, M. A., 2013). Diabetes mellitus (DM) is a chronic metabolic disorder with various causes characterized by high levels of glucose in the blood (Yosmar, R., Almasdy, D., & Rahma, F., 2018). Diabetes mellitus is currently a global health problem in society. Diabetes mellitus is a disease that has been increasing continuously from year to year in various countries in the world, both in developed and developing countries.

Based on data from Diabetes Atlas 8th Edition in 2017 issued by the International Diabetes Federation (IDF) in 2017, there were 382 million people in the world experiencing Diabetes Mellitus in 2013 and in 2017 it increased to 425 million people, and in 2045 it is expected to increase. reached 629 million people in the world. Then on the Asian continent, especially in the Southeast Asia region, in 2014 there were 96 million adults with diabetes mellitus in 11 countries with a prevalence of 8.6% in 2014. More than 60% of men and 40% of women with diabetes mellitus died before 70 years old. (WHO, 2016).

According to the 2018 Basic Health Research (RISKESDAS) report, there was an increase in the prevalence of people with diabetes mellitus in Indonesia in 2013-2018 from 6.9% to 8.5%. The results of the analysis of the prevalence of Diabetes Mellitus by age in Indonesia in 2018 also showed that the prevalence of diabetes mellitus in patients aged 15 years was 10.9%. In West Java Province, the prevalence increased by 2% in 2013. (Kemenkes, R. I., 2013).

The number of people with diabetes mellitus in Indonesia has increased from 8.5 million in 2013 to 10.3 million in 2017 and is expected to increase to 16.7 million in 2045, making Indonesia the 6th most people with diabetes mellitus. in the world. (Federation, I., 2017).

Based on data from the Ciamis District Health Office in January-June 2019, data on the number of diabetes mellitus in Ciamis district was 27,483 people. Data for people with diabetes mellitus in Kawali sub-district until the end of June 2019 who had been screened were 305 people.

Based on the etiology of the disease, Diabetes mellitus is divided into several types, namely; Type 1: Insulin dependent diabetes mellitus (IDDM), Type II: Non-insulin-dependent diabetes mellitus (NIDDM), Diabetes mellitus associated with other syndromes, and Diabetes mellitus gestational diabetes mellitus [GDM]). It is estimated that 5%-10% of patients have type I diabetes and approximately 90%-95% of patients have type II diabetes. (Brunner, S., & Suddarth, D., 2002).

Seeing the increase in people with diabetes mellitus both in the world and in Indonesia, the possibility of the incidence of diabetes mellitus in Indonesia will still increase. The need for efforts in the management of Diabetes mellitus, especially to keep blood sugar levels as close to normal as possible to prevent complications. Disease management in DM patients has an important role in controlling blood glucose levels. (Salindeho, A., Mulyadi, N., & Rottie, J., 2016). According to the Consensus on the Management and Prevention of Type 2 Diabetes Mellitus in Indonesia in 2015. Diabetes mellitus control can be grouped into four pillars, namely education, medical nutrition therapy, physical exercise and pharmacological intervention. (Indonesia, P. E, 2015).

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Objective

The purpose of this study was to identify the effect of the four pillars of diabetes mellitus control on the incidence of complications in patients with diabetes mellitus in Kawali sub-district, Ciamis district.

Method

This research is a descriptive-analytic study using a cross-sectional approach. The population in this study were all people with diabetes mellitus in Kawali District, Ciamis Regency, as many as 305 people. The sample was taken using the Purposive Sampling method as many as 30 respondents. Data collection in this study used primary data, namely data obtained directly from respondents, data collection in this study used questionnaire sheets and observation sheets. For the questionnaire sheet regarding the four pillars of diabetes mellitus control, respondents were asked to fill out and answer the questionnaire themselves.

Results

Table 1 Relationship between Education and Complications in Diabetes Mellitus Patients in Kawali District

Education	Complications				Total		ρ	x^2	OR
	There are Complications		No Complications				Value	Count	(95% CI)
	f	%	f	%	f	%			
good	4	13.3	21	70	25	83.3	0.034	4.509	7,875 (0.980-63.310)
not good	3	10	2	6.7	5	16.7			
Total	7	23.3	23	76.7	30	100			

Based on the results of the cross tabulation from table 1 above, it shows that of the 30 respondents, as many as 25 people (83.3%) with regard to diabetes mellitus education in the good category as many as 21 people (70%) had no complications of diabetes mellitus and 4 people (13%) had diabetes mellitus. complications of diabetes mellitus. Meanwhile, from 5 people (16.7%) with diabetes mellitus education in the less category as many as 2 people (6.7%) had no complications of diabetes mellitus and 3 people (10%) had complications of diabetes mellitus.

After statistical testing using the chi-square test with a 95% confidence level (α= 0.05), the chi-square value was 4.509 and the -value was 0.034. Based on the results of the data analysis above, it can be concluded that there is a relationship between education and the incidence of complications in patients with diabetes mellitus in Kawali District because the

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value of > -value (0.05 > 0.034) and the chi-square value count > chi- square table on df 1 (4.509 > 3.841) that H0 is rejected and Ha is accepted. From the analysis of the magnitude of the risk, the odds ratio (OR) in this study was 7.875 with a 95% confidence interval (CI) (0.980-63.310), it means that people with diabetes mellitus who have less education have 7.8 times the risk of experiencing diabetes mellitus. The incidence of complications of diabetes mellitus is compared with patients with diabetes mellitus who have good education.

Table 2 Relationship between Medical Nutrition Therapy and Complications in Diabetes Mellitus Patients in Kawali District

medical nutrition therapy	Complication				Total		ρ Value	χ2 count	OR (95% CI)
	There Are Complication		No Complication						
	f	%	f	%	f	%	0.005	7.950	17.000 (1,683-171,703
Suitable	1	3.3	17	56.7	18	60			
No Suitable	6	20	6	20	12	40			
Total	7	23.3	23	76.7	30	100			

Based on the results of the cross-tabulation from table 2 above, it shows that out of 30 respondents, 18 people (60%) with medical nutrition therapy for diabetes mellitus were in the appropriate category, 17 people (56.7%) had no complications of diabetes mellitus and 1 person (3.3%)) there are complications of diabetes mellitus. Meanwhile, from 12 people (40%) with regard to Medical Nutrition Therapy diabetes mellitus in the inappropriate category. A total of 6 people (20%) had no complications of diabetes mellitus and 6 people (20%) had complications of diabetes mellitus.

After statistical testing using the chi-square test with a 95% confidence level (α= 0.05), the chi-square value was 7.950 and the p-value was 0.005. Based on the results of the data analysis above, it can be concluded that there is a significant relationship between medical nutrition therapy and the incidence of complications in people with diabetes mellitus in Kawali District because the value of > -value (0.05 > 0.005) and the chi-square value count > chi-square table on df 1 (7.950 > 3.841) that H0 is rejected and Ha is accepted. From the analysis, it was also found that the odds ratio (OR) in this study was 17,000 with a 95% confidence interval (CI) (1,683-171,703), this means that people with diabetes mellitus who undergo inappropriate medical nutrition therapy have 17 times the risk of experiencing an adverse event. complications of diabetes mellitus compared with patients with diabetes mellitus who received appropriate medical nutrition therapy.

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Table 3 The Relationship between Physical Exercise and Complications in Diabetes Mellitus Patients in Kawali District

physical exercise	Complication				Total		ρ	χ2	OR
	There Are Complication		No Complication				*Value*	Count	(95% CI)
	f	%	f	%	f	%			
Exercise	1	3.3	11	36.7	12	40	**0.113**	**2.516**	**5.500**
No Exercise	6	20	12	40	18	60			**(0.568-53.215)**
Total	**7**	**23.3**	**23**	**76.7**	**30**	**100**			

Based on the results of the cross-tabulation from table 3 above, it shows that from 30 respondents, as many as 12 people (40%) with regard to physical exercise in the sports category, as many as 11 people (36.7%) had no complications of diabetes mellitus and 1 person (3.3%) had complications. diabetes mellitus. Meanwhile, from 18 people (60%) with regard to physical exercise in the non-exercise category as many as 12 people (40%) had no complications of diabetes mellitus and 6 people (20%) had complications of diabetes mellitus.

After statistical testing using the chi-square test with a 95% confidence level (α= 0.05), the chi-square value was 2.516 and the p-value was 0.113. Based on the results of the data analysis above, it can be concluded that there is no significant relationship between physical exercise and the incidence of complications in people with diabetes mellitus in Kawali District because the value of < p Value (0.05 < 0.113) and chi-square value calculate < Chi-square (table on df 1 (2,516 < 3,841) that H0 is accepted and Ha is rejected. From the analysis of the risk, the odds ratio (OR) in this study was 5,500 with a 95% confidence interval (CI) (0.568-53,215), this means that people with diabetes mellitus who do not exercise have a 5.5 times chance of experiencing complications. diabetes mellitus compared to people with diabetes mellitus who exercise.

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Table 4 The Relationship between Pharmacological Interventions and Complications in Diabetes Mellitus Patients in Kawali District

Pharmacological Intervention	Complication				Total		*ρ Value*	*χ2 Count*	OR (95% CI)
	There Are Complication		No Complication						
	f	%	f	%	f	%			
Obey	2	6.6	18	60	20	66.6	0.015	5.963	9.000 (1.325-61.138)
Not Obey	5	16.7	5	16.7	10	33.4			
Total	7	23.3	23	76.7	30	100			

Based on the results of the cross-tabulation from table 4 above, it shows that from 30 respondents, as many as 20 people (66.6%) with regard to pharmacological interventions in the obedient category as many as 18 people (60%) had no complications of diabetes mellitus and 2 people (6.6%) had diabetes complications. mellitus. Meanwhile, from 10 people (33.4%) with regard to pharmacological intervention in the non-adherent category, 5 people (16.7%) had no complications of diabetes mellitus and 5 people (16.7%) had complications of diabetes mellitus.

After statistical testing using the chi-square test with a 95% confidence level (α= 0.05), the chi-square value was 5.963 and the p-value was 0.015. Based on the results of the data analysis above, it can be concluded that there is a relationship between pharmacological interventions and the incidence of complications in people with diabetes mellitus in Kawali District because the value of > p Value (0.05 > 0.015) and the chi-square value count > Chi-square table on df 1 (5.963 > 3.841) that H0 is rejected and Ha is accepted. From the large-risk analysis, the odds ratio (OR) in this study was 9,000 with a 95% confidence interval (CI) (1,325-61,138), this means that people with diabetes mellitus who do not comply with pharmacological interventions have a 9 times risk of developing diabetes mellitus. the incidence of complications of diabetes mellitus compared to patients with diabetes mellitus who adhere to pharmacological interventions.

Discussion

1. Relationship between Education and Complications in Diabetes Mellitus Patients

The results of this study are in line with research conducted by Hilda Novyanda & Wini Hadiyani (2017) which states that education about poor diabetes mellitus will have a greater chance of developing complications. (Novyanda, H., & Hadiyani, W., 2017). The results of other suitable studies are the research conducted by Pardi (2017) which obtained the value of value = 0.002 (probability value (ρ) < (0.05)). This means that there is a significant relationship between adherence to the education pillar and the occurrence of neuropathy, (Pardi, 2017).

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Patients with diabetes mellitus need to obtain information about diabetes mellitus at least after the diagnosis is made. (Oktorina, R., Sitorus, R., & Sukmarini, L., 2019). The results of interviews with respondents, most of the sufferers have received information from health workers regarding the understanding of diabetes mellitus and its management.

Management of diabetes mellitus requires the role of health workers in providing diabetes mellitus education. Patients and families need to receive education to provide an understanding of the course of the disease, prevention, complications, and management of DM. A good understanding will greatly help increase family participation in DM management efforts in order to achieve better results (Indonesia, P. E., 2015).

The knowledge possessed about the disease and its management can raise awareness for people with diabetes mellitus and ultimately cause them to behave according to what they know. If you have good knowledge, people with diabetes mellitus can manage their disease well so as to prevent complications from diabetes. because patients can change positive behavior due to having good knowledge. Behavior that is based on knowledge will be better in action than behavior that is not based on knowledge. So that it can be said that good education in DM patients can prevent complications.

As a profession in the health sector, especially in the field of nursing, we can perform one of the functions as a nurse, namely the function of an educator in order to prevent complications from diabetes mellitus in people with diabetes mellitus. Counseling can be used as a means to provide insight to respondents so that the impact of complications in the future from diabetes mellitus that is not managed properly can be delayed or prevented.

2. The Relationship between Medical Nutrition Therapy and Complications in Diabetes Mellitus Patients

Patients with diabetes mellitus who undergo inappropriate medical nutrition therapy have 17 times the risk of developing complications of diabetes mellitus compared to patients with diabetes mellitus who undergo appropriate medical nutrition therapy.

The results of this study are in line with research conducted by Novia Handayani & Ani Mashunatul M (2017) The results of the analysis using the Chi square test obtained a significant value of p = 0.011 with a significance level of 0.05 (p <0.05), it can be concluded that there is There is a significant relationship between dietary compliance with the incidence of complications in patients with diabetes mellitus at the Gondokusuman I Public Health Center Yogyakarta. (Handayani, N., & Mahmudah, A. M., 2017).

Medical nutrition therapy is an important part of the comprehensive management of diabetes mellitus. The goal of the pillars of medical nutrition therapy is to help sufferers improve their nutrition and to gain better metabolic control. Medical nutrition therapy that is not appropriate or not optimal can cause blood sugar levels to get worse because the incoming food and drink is not properly controlled. For this reason, adherence to medical nutrition therapy is very necessary. One way to prevent the risk of complications and recurrence in diabetes mellitus is to apply dietary compliance in people with diabetes mellitus. (Dasopang, E. S., 2018). The ability to implement appropriate diet settings is a big challenge for people with diabetes mellitus, many people with diabetes mellitus complain because they feel bored to carry out a diabetes mellitus diet continuously.

There are several factors that influence adherence in the management of diabetes mellitus diet, among others, namely: age, gender, and family roles. (Hestiana, D. W., 2017). The key to the success of the pillars of medical nutrition therapy is the full involvement of team members (doctors, nutritionists, other health workers and patients and their families)

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(Indonesia, P. E., 2015). Health workers play an important role in providing information about medical nutrition therapy called 3J, namely the right schedule, the right amount and the right type in order to achieve normal blood sugar levels because patient compliance in carrying out the diet is needed in the management of diabetes mellitus.

The principle of eating arrangements in people with diabetes is almost the same as the recommendation for eating for the general public, namely a balanced diet and in accordance with the calorie and nutritional needs of each individual. People with diabetes need to be given emphasis on the importance of regular eating schedules, the type and amount of calorie content, especially in those who use drugs that increase insulin secretion or insulin therapy itself (Indonesia, P. E., 2015).

3. The Relationship between Physical Exercise and Complications in Diabetes Mellitus Patients

People with diabetes mellitus who do not exercise have a 5.5 times chance of experiencing complications of diabetes mellitus compared to people with diabetes mellitus who do exercise.

This study is in line with previous research conducted by Dian Musyafirah, et al (2016) with the results of the study stating that the level of physical activity did not show a significant relationship with the incidence of complications in patients with diabetes mellitus at Ibnu Sina Hospital in 2016. (Musyawirah, D., & Rismayanti, A. J., 2016).

Another study conducted by Nany Suryani, et al (2016) showed different and conflicting results with the results of this study. In his research, Nany obtained information from the results of statistical analysis using the chi-square test, the value of P = 0.00 (P <0.05) which stated that there was a significant relationship between exercise and controlling blood sugar levels in type 2 DM patients. 35,000 it can be said that respondents who exercise will control their blood sugar by 35 times compared to respondents who do not exercise. (Suryani, N., & Septiana, H., 2016).

The results of interviews with respondents showed that most respondents with diabetes mellitus said they rarely did a physical exercise on the grounds of busy work, weak complaints, and the assumption that daily activities were sufficient to be categorized as a form of physical exercise.

Physical exercise can lose weight and improve insulin sensitivity, which will improve blood glucose control. Daily physical activities and physical exercise are carried out regularly 3-5 times per week for about 30-45 minutes, for a total of 150 minutes per week. Pause between workouts of no more than 2 consecutive days. Regular physical exercise can cause muscle contraction to increase so that the permeability of cell membranes to glucose increases and insulin resistance decreases. (Indonesia, P. E., 2015).

4. The Relationship between Pharmacological Interventions and Complications of Diabetes Mellitus in Diabetes Mellitus Patients

Respondents who do not comply with pharmacological interventions have 9 times the risk of developing diabetes complications compared to respondents who adhere to pharmacological interventions.

The results of this study are in line with research conducted by Fitria Septin Aziza (2018) which states that patients with diabetes mellitus who do not comply with the use of oral hypoglycemic drugs have a risk of complications of 20 times compared to patients with diabetes mellitus who adhere to the use of oral hypoglycemic drugs. (Septin Aziza, F., &

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Karuniawati, H., 2018). This study is also supported by the results of research by Riza Alfiani (2015) which states that there is a significant correlation between medication adherence and blood sugar levels two hours after eating (p <0.05) with a negative correlation direction. (Alfian, R., 2015).

Control of diabetes mellitus can be started by implementing a diet (diet) according to calorie needs and a regular eating schedule, then with adequate physical exercise. Pharmacological intervention is given if control without drugs cannot control blood sugar levels as expected or is said to be less effective, then control of diabetes mellitus with pharmacological interventions can be done. (Almaini, A., & Heriyanto, H., 2019).

The results of therapy will not reach the optimal level without the awareness of the patient himself. Non-adherence in taking diabetes medication can be an obstacle to achieving blood sugar control efforts. (Alfian, R., 2015). The need for adherence of people with diabetes mellitus in the management of pharmacological interventions, adherence to treatment is important for people with diabetes mellitus so that treatment runs optimally. Good and correct treatment can reduce the risk of complications. Compliance behavior in the implementation of diabetes mellitus treatment can be influenced by age, gender, knowledge, and motivation. (Almira, N., Arifin, S., & Rosida, L., 2019).

Providing education to people with diabetes mellitus, especially in increasing patient knowledge to comply with drug therapy, affects patient understanding of the importance of controlling treatment. Increased knowledge about drug control is influenced by the information conveyed when providing appropriate education about treatment. Submission of drug information includes the purpose of treatment, dose and effectiveness of the drug, how to use it, frequency and duration of use, side effects, interactions, and how to store diabetes mellitus drugs.

From the discussion above, the researchers concluded that pharmacological interventions with the incidence of complications of diabetes mellitus have a close relationship. Although pharmacological intervention is not the only pillar in controlling diabetes mellitus. However, pharmacological interventions can reduce blood sugar levels so as to prevent complications.

Conclusion

Based on the results of data collection, processing and analysis regarding the Effect of the Four Pillars of Diabetes Mellitus Control on Complications in Diabetes Mellitus Patients in Kawali District, the authors can provide the following conclusions: There is a relationship between the education pillar (ρ-value = 0.034), medical nutrition therapy (ρ-value = 0.005), and pharmacological intervention (ρ-value = 0.015) with the incidence of complications in people with diabetes mellitus in Kawali sub-district, Ciamis district. There is no relationship between physical exercise (ρ-value = 0.113) with the incidence of complications in people with Diabetes Mellitus in Kawali sub-district, Ciamis district

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