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Host Factor of Chronic Kidney Disease on Type-2 Diabetes Mellitus

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Abstract
Prevalence of type-2 diabetes mellitus have increased significantly. The increasing number of people with diabetes has a major impact on the development of chronic diabetic kidney disease. The research was aimed to clarify several risk factors of chronic diabetic kidney disease on type-2 diabetes mellitus (CDK-DM). The research was based on case control study design. The number of respondents was 140 respondents consisting 70 cases and 70 controls that met the criteria of inclusion and exclusion. The cases were patients with type-2 chronic diabetic kidney disease stadium 2-5. The controls were patients with type-2 chronic diabetic kidney disease with blood sugar levels ≥ 200 mg / dL. The data were then analyzed using logistic regression. The result shows that risk factors of chronic diabetic kidney disease in type-2 diabetes mellitus are diabetes in family (OR = 6,732; 95% CI = 2,623- 17,276), high blood pressure (OR = 6,760; 95% CI = 2,190- 20,867), lack of physical activities (OR = 4,367 95% CI = 1,823-10,462) and lack of family support (OR = 4,203; 95% CI = 1,437-12,295). The probability of chronic diabetic kidney disease occurrence in type-2 diabetes mellitus when four risk factors exist are 96,71%. The host factors have important role of chronic diabetic kidney disease in type 2 diabetes mellitus . The factors proven to be risk factors for occurrence of chronic diabetic kidney disease in type 2 diabetes mellitus were diabetic in the family, Hipertension, poor physical exercise and family Support.

Keywords*: Risk factors, Chronic kidney disease, Type-2 Diabetes Mellitus*

I. INTRODUCTION

In 2015, one million adults in Southeast Asia region died of kidney disease as a result of one of the causes of complications of diabetes mellitus and ranks first as the cause of death by complication.(1) By 2014, the third leading cause of death in Indonesia is diabetes mellitus with complications of 6.7%. One of the complications that cause death in people with diabetes mellitus in Indonesia is a chronic kidney disease stage five.(2)

In West Kalimantan Province, cases of diabetes mellitus rank second in case finding after hypertension as the highest non-communicable disease, with a prevalence rate of 2014 is 3.6% and in 2015 is 3.8% per 1000 population. By the June 2016 data found that the number of diabetes mellitus cases in West Kalimantan Province reached 2,974 cases with the highest prevalence of sex-based is female.(3)

Based on data of RSUD DR Soedarso Pontianak City, in 2013, the number of cases of acute and chronic kidney disease stage five was observed in 324 people: 171 men and 153 are women with case fatality rate of 25.61%. In the year 2014 as much as 428 people: 195 men and 233 are women with case fatality rate of 21.49%. In the year 2015 as much as 326 people: 134 men and 192 are women with case fatality rate of 23.31%. In the year 2016, acute and chronic kidney disease stage five was observed 409 people: 208 men and 201 are women with case fatality rate of 16.87%.

The incidence of kidney disease caused by diabetes mellitus is increasing. Because of this trend, the proportion of physician practice in performing primary treatment is greater. Only if the patients with chronic kidney disease are referred to in a very late condition, the opportunity to conduct preventive interventions, with the aim of avoiding kidney replacement therapy, will lost.(4)

Type 2 diabetes mellitus is the etiology of chronic kidney disease after hypertension (5) in this case it is necessary to conduct a thorough evaluation of whether type 2 diabetes mellitus is an etiology or a comorbid disease. In this research will be conducted research related to the risk factors owned by the host by looking back on previous exposure.

Chronic kidney disease - diabetes is caused by various factors. The high prevalence and death of chronic kidney disease on type 2 diabetes mellitus is caused by the interaction between genetic susceptibility factors and exposure to the environment.(6)

Host genetic susceptibility factors can lead to chronic kidney disease on type 2 diabetes mellitus as time progresses. Those are the history of diabetes on family, the history of hypertension, the habit of less physical exercise (sport), suffering from type 2 diabetes mellitus, while for environment factors are all risk factors that can cause lifestyle changes associated with family support as a form of prevention and control.(7)

Research on risk factors for chronic kidney disease on type-2 diabetes mellitus needs to be done in the City of Pontianak Province of West Kalimantan. The purpose of this study is to analyze the factors associated with chronic kidney disease- diabetes (PGK - DM) on type 2 diabetes mellitus. By knowing these factors then proper program planning can be done so as not to increase the cost, maintenance time and accelerate the recovery of patients. Expected results are to reduce morbidity and mortality caused by chronic kidney disease- diabetes on type 2 diabetes mellitus in Pontianak City, West Kalimantan Province.

II. METHOD

This type of research is abservasional analytics with control case design. The population of this research were all patients with chronic kidney disease diabetes (PGK-DM) with type 2 diabetes mellitus aged >21 years in West Kalimantan Province. The subject of the case group is patients with chronic kidney disease- diabetes stage 2-5 and control subjects are type 2 diabetes mellitus patients who are treated in RSUD DR Soedarso and domiciled in Pontianak West Kalimantan Province.

The sample obtained using multistage random sampling technique consisted of 140 people, 70 sample of cases and 70 control samples. This study was conducted on July to August 2017. Data were collected using questionnaires, interviews and observation of hospital health record data. Data were analyzed by using logistic regression test.

III. RESULT AND DISCUSSION

A. Diabetes mellitus on family, the habit of less physical exercise or sport, hypertension and family support

Table 2. Distribution of diabetes mellitus on family, the habit of less physical exercise or sport, hypertension, and family support

Independent variable	Frequency	Percentage
Diabetes mellitus on family		
- With history	64	45.7
- No history	76	54.3
Less physical exercise or sports		
- Less sports	66	47.1
- No sport	74	52.9
Hypertension		
- Hypertension	109	77.9
- No hypertension	31	22.1
Family support		
- Less support	31	22.1
- Support	109	77.9

B. The relationship between diabetes mellitus on family, the habit of less physical exercise or sport, hypertension and family support

Table 3. The relationship between diabetes mellitus on family, the habit of less physical exercise or sport, hypertension and family support with chronic kidney disease of diabetes (PGK-DM)

Variable	Case		Control		p *value*	OR
	n	(%)	n	(%)		
Diabetes on family						
- With history	42	60.0	22	31.4	0.001	3.273
- No history	28	40.0	48	68.6		
The habit of less exercise or sport						
- No exercise	42	60.0	24	34.3	0.002	2.875
- Do exercise	28	40.0	46	65.7		
Hypertension						
- Hypertension	62	88.6	47	67.1	0.002	3.793
- No hypertension	8	11.4	23	32.9		
Family support						
- Less support	23	32.9	8	11.4	0.002	3.793
- Support	47	67.1	62	88.6		

C. The effects of diabetes mellitus on family, the habit of less physical exercise or sport, hypertension adn family support toward chronic kidney disease of diabetes (PGK-DM)

Based on the statistical analysis in table 4, with the four variables are diabetes mellitus on family, the habit of less physical exercise or sport, hypertension and family support, have an influence with chronic kidney disease. This is indicated by the significance value of p <0.025 (p <0.05), Exp (B) Value = 6.732 which means that patients with diabetes mellitus on family have risk 6,732 times to experience chronic kidney disease of diabetes (PGK-DM), Exp (B) Value = 4.367 means that patient with the habit of less physical exercise or sport has risk of 4,367 times to experience chronic kidney disease of diabetes (PGK-DM), Exp (B) Value = 6.760 which means that people with hypertension have risk 6.760 times to experience chronic kidney disease of diabetes (PGK-DM), Exp (B) Value = 4.203 which means that patients with less family support have a risk of 4.203 times for chronic kidney disease of diabetes (PGK-DM).

Table 4. The effects of diabetes mellitus on family,the habit of less physical exercise or sport, hypertension and family support toward chronic kidney disease of diabetes (PGK-DM)

Variable	β	Sig	Exp (B)	95% CI	
				Lower	Upper
Diabetes mellitus on family	1.907	0.000	6.732	2.623	17.276
The habit of less physical exercise or sport	1.474	0.001	4.367	1.823	10.462
Hypertension	1.911	0.001	6.760	2.190	20.867
Family support	1.436	0.009	4.203	1.437	12.295
Constant	-3.352				

D. Diabetes mellitus on family

Statistical analysis showed that there is an effect of diabetes on family with PGK-DM incidence. The family is one of the major risk factors for chronic kidney disease in type 2 diabetes mellitus. The genetic factor is something inherited. Some genes in the family are endowed with different susceptibilities in each population.[8] The research review conducted by Bilious in 2008 on 180 samples showed results that albuminuri level is increased in patients' homozygot with DD genotype.[9]

Based on the results of in-depth interviews with respondents stated that people with type-2 diabetes mellitus generally have family members who are also suffering from diabetes regardless whether close or far family. Based on data obtained. the patients with PGK-DM with family history of diabetes is 42 people or 60.0%.

E. The habit of less physical exercise or sport

Statistical analysis indicates that there is an effect of physical exercise or sport with the incidence of PGK-DM. This is in line with the theory that physical exercise or sport which is done with moderate or high intensity and regularly can lower the blood glucose levels in the early stages of exercise. The hepatic glucose production increases with a decrease in insulin levels. Glucose levels in healthy people remain fairly constant during exercise.[10] This is in line with the Kaufaki research of 2014 which obtained the results that increasing the physical activity can reduce the decline of physical function and improve physiological reserves and reduce comorbid events and improve quality of life.[11]

G. Hypertension

Statistical analysis showed that there is an effect of hypertension with the incidence of PGK-DM type-2. Research shows that hypertension may be the most important predictor for diabetes and can develop into chronic kidney disease. Also it is very important for diabetes patients to keep their blood pressure lower than 130/80.[12] This result is in line with Ikawati's research in Semarang in 2016 that obtained the p = 0.000. The result of data analysis shows that the length of suffering hypertension ≥5 years is the risk of higher terminal PGK with (OR = 10.89. 95% CI = 3.08-38.59).[13]

H. Family support

Statistical analysis showed that there is an effect of family support with the incidence of PGK-DM type-2. Family support is less influential in the incidence of chronic kidney disease (PGK-DM). especially in stage five. A study conducted by Bestari in 2016 in Surabaya showed that patients with less family support would have 4.2 times greater in experiencing the chronic kidney disease.[14] This study is in line with a study conducted by Thojampa in 2017 showing that by following an independent support program and a family support improvement program. the results of the experimental group of type-2 Diabetes mellitus patients changed significantly with less damage to nephrons than the control group with P value 0.000.[15]

IV. CONCLUSION

The results of the research of patients with type-2 diabetes mellitus showed that diabetes on family, less physical exercise or sport, hypertension and family support have llittle effect on the incidence of chronic kidney disease-diabetes.

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