Analysis of Diabetes Mellitus Risk Factors in Blitar Regency

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ABSTRACT

Diabetes mellitus is a serious chronic disease that occurs because the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. Risk factors for DM are age, gender, family history, obesity, central obesity, hypertension, dyslipidemia, lack of physical activity, unhealthy diet and smoking. Indonesia was ranked the sixth highest prevalence of Diabetes Mellitus in the world in 2017, namely 2%, East Java 2.6% and Blitar Regency 2.6%. The high prevalence rate of DM in Blitar Regency which exceeds the national prevalence is a challenge that must be faced, because the target of the Sustainable Development Goals (SDGs) in 2030 is a reduction of one third of premature deaths due to non-communicable diseases. The purpose of this study was to analyze the risk factors for Diabetes Mellitus in Blitar Regency. Method using Quantitative research design, using secondary data with the Non-Probability Purposive Sampling method, the number of samples of 400 samples and analyzed using the Case Control method. The results of statistical tests showed that age, family history, obesity, central obesity and hypertension were associated with DM. While gender is not related to the incidence of DM. Based on the results of the multivariate test, it is known that the most dominant factors affecting the incidence of DM in Blitar Regency are family history, age> 45 years, hypertension, and central obesity. It is suggested that future studies use a longitudinal cohort design to determine whether risk factors actually correlate with effect factors and to see a clear causal relationship.

Keywords : Diabetes Mellitus, Risk Factors

INTRODUCTION

Diabetes mellitus is a serious chronic disease that occurs because the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. Diabetes mellitus is categorized into four types, namely: Type 1 DM, Type 2 DM, Gestational DM and Other Types of DM. The pathogenesis of DM is caused by eight things (omnious octet), namely: failure of pancreatic β cells, liver, muscle, fat cells, intestines, pancreatic alpha cells, kidneys and brain. Diabetes mellitus risk factors consist of non-modifiable risk factors and modifiable risk factors. Non-modifiable risk factors, namely: age, sex and hereditary history. Modifiable risk factors, namely: obesity, central obesity, hypertension, dyslipidemia, lack of physical activity, unhealthy diet and smoking. The main symptoms of DM are: fast hunger (polyphagia), thirst (polydipsia) and frequent urination (polyuria). The diagnosis of DM was established on the basis of examining blood glucose levels: fasting blood glucose ≥ 126 mg / dl or random blood glucose ≥ 200 mg / dl with classic symptoms. Complications of DM range from relatively mild, namely retinopathy, neuropathy and nephropathy to severe ones, namely coronary heart disease and stroke, as well as decreased consciousness due to hypoglycemia / hyperglycemia. DM can cause disability and even death.

In early 2020, the world was shocked by the Covid-19 Pandemic which was caused by the Corona SARS-CoV-2 virus and has infected more than 24 million people worldwide, with a death toll of more than 800 thousand people. 99% of these deaths are caused by

comorbid factors. Diabetes is the second comorbidity after hypertension with a death rate three times that of sufferers in general, namely 7.3% versus 2.3% (Perkeni, 2020). Indonesia was ranked the sixth highest prevalence of Diabetes Mellitus in the world in 2017 after China, India, the United States, Brazil and Mexico, namely 2% or 10.3 million sufferers. The prevalence of diabetes deaths in Indonesia is the second highest after Sri Lanka. The prevalence of Diabetes Mellitus based on doctor's diagnosis in population aged ≥ 15 years increased from 1.5% in Riskesdas 2013 to 2% in Riskesdas 2018. The prevalence of Diabetes Mellitus in East Java ranks fifth out of 38 provinces, namely 2.6% in 2018, an increase from 2.1% in 2013. The prevalence of Diabetes Mellitus in Blitar Regency is ranked 23 out of 38 districts / cities or the same with an average prevalence in East Java of 2.6%, an increase from 1.2% in 2013. Blitar Regency, with a population of 1,160,677 people in 2019, has a target population of ≥15 years of age of 907,255 people. With a prevalence of 2.6%, it is estimated that people with Diabetes Mellitus in Blitar Regency are 23,589 people, but 18,871 people have been diagnosed, so it is estimated that there are 4,718 people who are not diagnosed and do not know they have diabetes.

The high prevalence rate of Diabetes Mellitus in Blitar Regency (2.6%) which exceeds the 2% National prevalence is a challenge that must be faced, because the target of the Sustainable Development Goals (SDGs) in 2030 is a reduction of one third of premature deaths due to non-communicable diseases. The data states that 80% of diabetes incidents can be prevented but 2/3 of people with diabetes do not know they have diabetes (Kemenkes RI, 2019). The alleged cause of the problem in this case is the lack of prevention efforts based on awareness of the Diabetes Mellitus risk factors. Therefore, researchers are interested in conducting a study: "Analysis of Risk Factors for Diabetes Mellitus in Blitar Regency", so that cases of Diabetes Mellitus can be prevented from an early age. The formulation of the problem in this study is, what is the most dominant risk factor affecting the incidence of Diabetes Mellitus in Blitar Regency? Based on the background and description above, the objectives of this study are: general purpose: to analyze the risk factors for Diabetes Mellitus in Blitar Regency, specific objectives: identifying the most dominant risk factors affecting the incidence of Diabetes Mellitus in Blitar Regency.

This research is in accordance with what was conducted by Nur Isnaini[7], et al, in 2018, the risk factors affect the incidence of type two Diabetes mellitus, with the results of the study that the risk factors that are proven to affect the incidence of type two DM in the Work Area of Puskesmas I Wangon are family history of DM (OR = 10.938), unhealthy diet (OR = 0.424), age ≥ 45 years (OR = 0.312), obesity BMI (OR = 0.297), low education level (OR = 0.272). Risk factors that are not proven to affect the incidence of type two diabetes are work, physical activity, exposure to smoke, and blood pressure.

Other research related to Diabetes Mellitus risk factors was also conducted by Vanesa Bellou[8], et al, 2018, Risk factors for type 2 diabetes mellitus: An exposure-wide umbrella review of meta-analyzes, obtained the results of causal effects that were highly suggestive of the BMI variable, blood pressure. systolic, serum gamma-glutamyl transferase, and waist circumference. A causal relationship was also claimed for birth weight, but a relatively small number of T2DM cases were included in this analysis. The effects observed for alcohol intake, coffee intake, serum CRP, serum ferritin, serum uric acid and serum vitamin D were not causal. Milk intake shows weak evidence and shows no causal effect.

Similar research was also conducted by Reshma Patil[9], et al, India 2019, Risk factors for type 2 diabetes mellitus: An urban perspective, with the results of the study that there is a significant increase in the prevalence of diabetes with increasing age (ages 20-34 years: 1.66 %, 35-49 years: 7.53%, ≥50 years: 15.66%, and P <0.05). In addition, male gender, obesity, waist circumference, WHR, and diabetes mellitus were found to be statistically significant.

Based on some of the studies above, it is known that risk factors such as increasing

age, family history of diabetes mellitus, lack of physical activity, and central obesity are the most common factors found in diagnosed cases of diabetes mellitus. Therefore, lifestyle changes and awareness of risk factors are needed to control diabetes.

METHODS

The design of this research is quantitative research, using secondary data with the Non-Probability Purposive Sampling method, and analyzed using the case control method. The population of this study were people aged >15 years in January 2020 and living in the Blitar Regency area. Total population: 907,255 people. The sample is the population aged >15 years who live in Blitar district and have been inspected for NCD in Posbindu and have complete data on record, the number of samples is 400 people. The dependent variable is the incidence of Diabetes Mellitus with a nominal data scale, the independent variables are age, gender, family history, obesity, central obesity and hypertension, with a nominal data scale. The statistical test uses the Logistic Regression test which includes univariate analysis, bivariate analysis, and multivariate analysis.

RESULTS

Distribution of Respondents Based on Variables

Table 1: Distribution of respondents based on variables

Variabel		DM		Non-DM	
		n	%	n	%
Age	≤ 45 years	68	34	141	70.5
	>45 years	132	66	59	29.5
	Total	200	100	200	100
Gender	Male	68	34	81	40.5
	Female	132	66	119	59.5
	Total	200	100	200	100
Family History	No family history	148	74	187	93.5
	There is a family history	42	26	13	6.5
	Total	200	100	200	100
Obesity	Non-Obesity	112	56	138	69
	Obesity	88	44	62	31
	Total	200	100	200	100
Central Obesity	Non-Central Obesity	82	41	130	65
	Central Obesity	118	59	70	35
	Total	200	100	200	100
Hipertension	Non-Hipertension	119	59.5	163	81.5
	Hipertension	81	40.5	37	18.5
	Total	200	100	200	100

Effect of Variables on the Incidence of Diabetes Mellitus

Table 2: Effect of variables on the incidence of diabetes mellitus

Variabel	Diabetes Mellitus				*P value*	OR	CI (95%)
	DM		Non-DM				
	n	%	n	%			

Age							
≤ 45 years	68	34	141	70.5	0,0001	4,639	3,042 – 7,073
>45 years	132	66	59	29.5			
Total	200	100	200	100			
Gender							
Male	68	34	81	40.5	0,179	0,757	0,504 – 1,136
Female	132	66	119	59.5			
Total	200	100	200	100			
Family History							
No family history	148	74	187	93.5	0,0001	5,054	2,652 – 9,632
There is a family history	42	26	13	6.5			
Total	200	100	200	100			
Obesitas							
Non-Obesity	112	56	138	69	0,007	1,749	1,161 – 2,634
Obesity	88	44	62	31			
Total	200	100	200	100			
Central Obesity							
Non-Central Obesity	82	41	130	65	0,0001	2,672	1,783 – 4,006
Central Obesity	118	59	70	35			
Total	200	100	200	100			
Hipertension							
Non-Hipertension	119	59.5	163	81.5	0,0001	2,999	1,902 – 4,727
Hipertension	81	40.5	37	18.5			
Total	200	100	200	100			

Most Dominant Risk Factors Affecting the Incidence of Diabetes Mellitus

Table 3: Prediction Model of Diabetes Mellitus in Blitar Regency

Variable	B	Wald	Sig	Exp (B)	CI
Age	1,208	26,408	0.0001	3,345	2,111 - 5,303
Family History	1,427	16,743	0.0001	4,164	2,103-8,247
Central Obesity	0.610	7,100	0.008	1,175	1,175-2,884
Hypertension	0.558	4,472	0.034	1,042	1,042-2,931
Constant	-1,224	42,897	0.0001		

DISCUSSION

Effect of Age on the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that respondents aged ≤ 45 years in the DM group were 68 respondents (34%) and the non-DM group were 141 respondents (70%). Respondents aged> 45 years in the DM group were 132 respondents (66%) and the non-DM group were 59 respondents (29.5%). Based on this data, it can be seen that the percentage of DM sufferers is higher in respondents aged> 45 years compared to respondents aged ≤ 45 years who tend not to suffer from diabetes.

Based on the results of data analysis, the p value is 0.0001. Based on this value, because the p value <0.05, it can be concluded that there is a relationship between age and the incidence of diabetes mellitus. The OR (Odds Ratio) value shows how much influence age has on the incidence of DM. The OR value of the data above shows a value of 4.639, meaning that respondents aged> 45 years are 4.639 times more at risk than those aged ≤ 45 years. Respondents aged> 45 years were at least 3.042 times more likely to suffer diabetes and the greatest risk was 7.073 times suffer from diabetes.

Effect of Gender on the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that male respondents in the DM

group were 34% and the non-DM group was 40.5%. Respondents with female gender in the DM group were 66% and the non-DM group was 59.5%. Based on these data, it can be seen that diabetes sufferers are common in women.

Based on the results of data analysis, the p value was 0.179. Based on this value, because the p value> 0.05, it can be concluded that there is no relationship between gender and the incidence of diabetes mellitus. The OR (Odds Ratio) value of the data above shows a value of 0.757, which means that respondents with female gender are 0.757 times more at risk than respondents with male gender. Respondents with the female gender were at least 0.504 times more likely to suffer from diabetes and the greatest risk was 1.136 times more likely to suffer from diabetes.

Family History Influences Against the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that the respondents who had no family history in the DM group were 74%, and those in the non-DM group were 93.5%. Respondents with a family history of diabetes mellitus in the DM group were 26% and the non-DM group was 6.5%. Based on these data, it can be seen that there are more DM patients in the group with a family history.

Based on the results of data analysis, the p value is 0.0001. Based on the p value <0.05, it can be concluded that there is a relationship between family history and DM to the incidence of DM. The OR (Odds Ratio) value of the data above shows a value of 5.054, meaning that respondents who have a family history of DM are 5.054 times more at risk than those who do not have a family history of DM. Respondents who have a family history of diabetes are at least 2.652 times more likely to suffer from diabetes and the greatest risk of suffering from diabetes is 9.632 times.

The Effect of Obesity on the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that non-obesity respondents in the DM group were 56% and in the non-DM group were 69%. Respondents with obesity in the DM group were 88% and the non-DM group was 31%. Based on these data, it can be seen that there are more DM patients in the Obesity group.

Based on the results of data analysis, the p value was 0.007. Based on this value, because the p value <0.05, it can be concluded that there is a relationship between obesity and the incidence of DM. The OR (Odds Ratio) value of the data above shows a value of 1.749, which means that respondents with obesity have a risk of 1.749 times than respondents who are not obese. Respondents who were obese were at least 1,161 times more likely to suffer DM and the greatest risk of suffering from diabetes was 2,634 times.

Effects of Central Obesity Against the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that the respondents of Central Non-Obesity in the DM group were 41% and the non-DM group was 65%. Respondents with central obesity in the DM group were 59% and the non-DM group was 35%. Based on these data it can be seen that DM patients are more in the central obesity group.

Based on the results of data analysis, the p value is 0.0001. Based on this value, because the p value <0.05, it can be concluded that there is a relationship between central obesity and the incidence of diabetes mellitus. The OR (Odds Ratio) value of the data above shows a value of 2.672, which means that respondents with central obesity have a risk of 2.672 times than respondents with no central obesity. Respondents with central obesity were at least 1.783 times more likely to suffer from diabetes mellitus and the greatest risk was 4.006 times more likely to suffer from diabetes mellitus.

The Effect of Hypertension on the Incidence of Diabetes Mellitus

The results of the analysis in this study showed that non-hypertensive respondents in the DM group were 59.5% and the non-DM group was 81.5%. Respondents with hypertension in the DM group were 40.5% and the non-DM group was 18.5%. Based on these data, it can be seen that DM patients are more in the hypertension group.

Based on the results of data analysis, the p value is 0.0001. Based on this value, because the p value <0.05, it can be concluded that there is a relationship between hypertension and the incidence of diabetes mellitus. The OR (Odds Ratio) value of the data above shows a value of 2.999, which means that respondents with hypertension have 2.999 times the risk of respondents without hypertension. Respondents with hypertension were at least 1,902 times more likely to suffer from diabetes mellitus and the greatest risk was 4.727 times of suffering from diabetes mellitus.

The Most Dominant Risk Factors Affecting the Incidence of DM

From the results of the overall multivariate analysis, the regression equation obtained is as follows:
Diabetes mellitus logit = -1,224 + (1,427 x family history) + (1,208 x age > 45 years) + (0.558 x hypertension) + (0.610 x central obesity).

The family history variable is the first variable that has the greatest influence on the incidence of diabetes mellitus because it has the largest logit value of the other variables, namely 4.164, which means that people who have a family history of diabetes have a chance to experience diabetes mellitus by 4,164 times compared to people who have no history. family with diabetes, after being controlled / influenced by variables of age, gender, obesity, central obesity and hypertension.

The age variable is the second variable that most influences the incidence of diabetes mellitus with a logit value of 3,345, meaning that people aged> 45 years or the older a person has a chance to experience diabetes mellitus by 3,345 times compared to people aged ≤45 years, after being controlled/influenced by gender, family history, obesity, central obesity and hypertension.

The central obesity variable is the third variable that has the greatest influence on the incidence of diabetes mellitus with a logit value of 1.175, meaning that people with central obesity have a chance to experience diabetes mellitus by 1,175 times compared to people who have normal abdominal circumference or do not have central obesity, after controlled / influenced by variables of age, gender, family history, obesity, and hypertension.

The hypertension variable is the fourth variable that has the greatest influence on the incidence of diabetes mellitus with a logit value of 1.042 which means that people who suffer from hypertension have a chance to experience diabetes mellitus by 1,042 times compared to people who have normal blood pressure or do not suffer from hypertension, after being controlled. / influenced by variables of age, gender, family history, obesity, and central obesity.

Obesity variable is the fifth variable that most influences the incidence of diabetes mellitus with an OR value of 1.749 meaning that people with obesity have a chance to experience diabetes mellitus by 1.749 times compared to people who have normal weight or are not obese, after being controlled / influenced by variables age, gender, family history, central obesity, and hypertension.

The gender variable has a p value> 5%, namely 0.179, which means that the gender variable is proven to have no relationship to the incidence of diabetes mellitus. The OR value of the gender variable also has a low value, namely 0.757, which means that it does not significantly affect the incidence of Diabetes Mellitus.

Based on the analysis, the determinant coefficient (R square) was 0.269, meaning that

the regression model obtained could explain 26.9% of the variation in the dependent variable of diabetes mellitus. Thus, the variables age, sex, family history, obesity, central obesity and hypertension, can only explain the variation in the variable diabetes mellitus by 26.9%. While the remaining 73.1% is explained by other variables not examined.

CONCLUSION

Risk factors that have a relationship with the incidence of Diabetes Mellitus in Blitar Regency are family history, age> 45 years, hypertension, central obesity and obesity. Meanwhile, gender risk factor has no known relationship with the incidence of Diabetes Mellitus in Blitar Regency. The most dominant risk factors affecting the incidence of Diabetes Mellitus in Blitar District are family history, age> 45 years, hypertension and central obesity.

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