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Association of Individual Characteristic and Blood Pressure with Prevalence of Diabetes Mellitus

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Abstract--- *In Indonesia, diabetes mellitus (DM) is a serious threat to health development because it can lead to blindness, kidney failure, foot diabetes, heart disease and stroke. In 2018, there were 4.434 total patients with DM who went for outpatient treatment at the Sidoarjo Regional Hospital. This number is still lower when compared to 2017, which is 5.262 sufferers. However, more worryingly, patients who are found to be younger. The purpose of this study is to analyze the individual characteristics and blood pressure with diabetes disease incidence. This type of research is an analytical study using a cross-sectional approach. The population was all villagers in Balongtani with the required sample size of 70 respondents. The sampling technique was done by purposive sampling. Data obtained by using questionnaires and analyzed using a chi-square test with alpha 0.05. The result showed that there was a significant relationship between age and DM (p = 0.001), between the sexes and DM (p = 0.001), also between smoking and DM (p = 0.002) as well as there was a significant relationship between blood pressure and DM incidence (p = 0.016). The conclusion of this study is people age more than 50 years would have a risk of DM 0,03x. Women will be at risk of DM up to 0.077x. People who have a history of smoking, especially active smoking can be at risk of developing DM. S Seorang who have a history of hypertension would be at risk of developing DM by 9x. Things that need to be considered are the need to emphasize promotive and preventive efforts to prevent DM and various risk factors. Always maintain a healthy lifestyle, do not smoke and maintain the dietary habit.*

Keywords--- *Individual Characteristic, Blood Pressure, Diabetes Mellitus.*

I. INTRODUCTION

Non-communicable diseases have become a public health problem, globally, regionally, nationally and locally. One of the non-communicable diseases that takes a lot of attention is Diabetes Mellitus (DM). In Indonesia, DM is a serious threat to health development because it can cause blindness, kidney failure, diabetic foot (gangrene) so it must be amputated, heart disease and stroke.

Global status report on NCD of the World Health Organization (WHO) in 2010 reported that 60% of the causes of death of all ages in the world were due to non-communicable diseases. DM was ranked 6th as the cause of death. About 1.3 million people die from diabetes and 4 per cent die before age 70. In 2030 it is estimated that DM ranks 7th in the world cause of death. Whereas in Indonesia it is estimated that in 2030 there will be as many as 21.3 million people with DM.

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Diabetes mellitus is still ranked in the top five diseases handled by the Sidoarjo Regional Hospital. Until November 2017, there were 5.444 cases of uncomplicated diabetes mellitus. The age range of the patient was widespread. Not only adults or the elderly but also children. In 2018, a total of 4.434 outpatients with diabetes. This figure is still lower than last year, which was 5.262 patients. However, the disease entered the top ten in the last two years. Even more worrying, patients who were found to be younger. There are some teenagers who are treated for diabetes. Although the majority are due to hereditary or since birth, there are also teenagers who are affected by diabetes due to extreme lifestyles.

Given the magnitude of the DM problem, the Ministry of Health of the Republic of Indonesia prioritizes controlling DM among other metabolic disorders besides comorbidities such as hypertension, coronary heart disease and stroke. The Ministry of Health is currently focusing on controlling DM risk factors through promotive and preventive efforts by not ignoring curative and rehabilitative efforts.

One of the DM control activities carried out by the Ministry of Health is monitoring and early detection of DM risk factors in Posbindu (Pos Pembinaan Terpadu/Integrated Founding Station) and the implementation of CERDIK behaviour. Posbindu non-communicable diseases is a community participation activity in controlling DM risk factors independently and sustainably. At present, there are 7.225 Posbindu throughout Indonesia. Posbindu non-communicable diseases activities are expected to be implemented in every order/community group. CERDIK has meaning, checks health regularly, eliminates cigarette smoke, diligently physical activity, healthy and balanced diet, adequate rest, managing stress. With the background presented above, this study will try to understand the relationship between the incidence of diabetes with several things, such as the characteristics of each individual and the presence of other accompanying risk factors such as blood pressure status.

II. METHODOLOGY

This type of research is an analytical study using a cross-sectional approach. The population was all villagers in Balongtani with the required sample size of 70 respondents. The sampling technique was done by purposive sampling. The variables studied included individual characteristics (age, sex and smoking activity), blood pressure (hypertension) and diabetes mellitus. The research data comes from primary data and secondary data. Secondary data was based on reports on the incidence of diabetes mellitus in previous years and interpreted through graphs, tables and narratives. Primary data was the result questionnaires and in-depth interviews that made in transcripts and perform coding using a matrix. Primary data collection is done through questionnaires and in-depth interviews with informants. In-depth interviews refer to the questionnaire used the closed question model. Interviews were carried out for ± 30 minutes. Secondary data by conducting studies on the incidence of diabetes mellitus in previous years. Data obtained then statistical analyzed using non-parametric statistics with the chi-square test.

III. RESULTS

Individual characteristics

The characteristics of respondents that have been obtained during the study can be illustrated in the following table.

Table 1 Characteristics of Respondents

No	Characteristics of Respondents	Frequency	Percentage (%)
1	Gender		
	a. Man	25	35,7
	b. Women	45	64,3
2	Age		

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No	Characteristics of Respondents	Frequency	Percentage (%)
	a. <50 years old	26	37,1
	b. >50 years old	44	62,9
3	Last education		
	a. No school	3	4,3
	b. Not completed in elementary school	6	8,6
	c. Elementary School/equivalent	13	18,6
	d. Graduated from Middle School/equivalent	22	31,4
	e. Graduated from high school/equivalent	20	28,6
	f. College	6	8,6
4	Smoking Activity		
	a. Yes	14	20,0
	b. Not	49	70,0
	c. Has Stopped	7	10,0

Based on Table 1 above, it can be informed that the sex of the respondents in this study was mostly (64.3%) female. Black and Hawk (2005) suggested that gender is one of the factors that can influence health behaviour, including in regulating diet. Based on the results of the analysis test it is known that there is a significant relationship between the sex of the respondent and the incidence of diabetes mellitus. According to Price and Wilson (2006) states that in cases of diabetes mellitus is more prevalent in women than men because of factors such as obesity and pregnancy. The amount of fat in women is around 20-25% of total body weight (BB), which is higher than adult men which range from 15-20%.

The number of women who suffer from DM is higher than the number of men. This is because of the level of sensitivity to the workings of insulin in the muscles and liver. Estrogen is a hormone that women have. Increased and decreased levels of the hormone estrogen which can affect blood glucose levels. When estrogen levels increase, the body becomes resistant to insulin (Brunner & Suddarth, 2014).

Regarding women who are more at risk for experiencing chronic DM, complications can be caused by, in addition to the menopause phase, a history of gestational diabetes also increases the likelihood of women experiencing type 2 diabetes later in life and complications due to diabetes.

Based on Table 1 above, it can be informed that the majority of respondents aged (62.9%) more than 50 years. The elderly group, in general, has a very high risk for diabetes mellitus. Based on the results of the analysis test it is known that there was a significant relationship between the respondents' age and the incidence of diabetes mellitus. People age more than 50 years would be at risk of diabetes by 0,03x than people age under 50 years. Age can affect the risk of type 2 diabetes (Lathifah, 2017).

Age of 50s is a vulnerable age because it is less active in daily physical activity to become one of the influential factors in the onset of diabetes. The elderly group is quite susceptible to carbohydrates metabolic disorders that can appear as DM, but clinical symptoms of diabetes in the elderly are often not specific. DM in the elderly is often not realized until the emergence of another or new disease realized after the occurrence of chronic diseases (WHO, 2005). Various studies show that along with the increase in age, the risk of suffering from glucose intolerance also increases. According to WHO at the age of> 30 years, the increase in blood glucose levels can be up to 1-2 mg /dL/year when not eating and will increase by

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5.6-13 mg / dL at 2 hours after eating (Sudoyo, et al., 2009). Diabetes will usually arise when they have entered the vulnerable age, namely the age of> 45 years who are overweight so that insulin in the body is not sensitive.

Early diagnosis through DM screening in old age is very necessary to do. Sugar blood control properly can reduce or even avoid the risk of complications. Doing sugar blood control in the elderly group was not strictly necessary, considering the risk of hypoglycemia in elderly patients with DM. However, there should also be more attention to young age groups, to be able to be more of a better life, applying the health paradigm, healthy lifestyle and always try to avoid risk factors. Besides that, do not forget to diligently conduct health checks, such as routine blood sugar checks as a form of preventive effort.

Based on education history, almost half (31.4%) have the latest education level graduating from Middle School/equivalent. Meanwhile, based on the history of smoking activities, most of the respondents (70.0%) did not smoke. Smoking has been shown to be a risk factor for diabetes and increase the risk of complications in patients with diabetes. Based on the results of the analysis test, it is known that there is a significant relationship between the smoking activity of respondents and the incidence of diabetes mellitus. Research conducted by Diana, Sety & Tina (2018) shows that exposure to secondhand smoke in the high-risk category is a risk factor for type 2 DM. Based on Trisnawati & Setyorogo (2013), cigarette smoke can increase blood sugar levels. The effect of nicotine on cigarette smoke can stimulate the adrenal glands and can increase glucose levels in the blood.

Smokers tend to be risky to have central obesity compared with non-smokers, this is because the smoke has the effect of antiestrogen and can upset the balance of hormones and cause central obesity where obesity overall and central obesity have a strong relationship in the increased incidence of type 2 diabetes mellitus (Yufang, 2012). The results of the study by Wang, et al. (2013) showed that passive smoking was associated with a 28% increase in the incidence of type 2 DM. A smaller increase was seen in passive smokers, but both were significantly associated with an increase in type 2 DM.

When someone has a history of smoking, blood vessels are narrowed because of substances contained in cigarettes. Besides that, smoking can also interfere with the sugar content in the blood that is owned by diabetics. Combination of the two would create a pile that accumulates on the walls of the blood vessel wall that can cause blood circulation disorders. Smoking also has shown to increase the risk of insulin resistance that can cause the body can no longer produce insulin properly. Insulin resistance often leads to the onset of diabetes, particularly type two diabetes.

Blood pressure

The description of the condition of blood pressure or the incidence of hypertension from respondents in the study can be illustrated in the following table

Table 2 Overview of Hypertensive Events

No	Hypertension incidence	Frequency	Percentage (%)
1	Non-Hypertension	51	72,9
2	Hypertension	19	27,1
Total		70	100,0

Based on Table 2 above, it can be informed that based on the incidence of hypertension, most of the respondents (72.9%) did not have high blood pressure or Non-Hypertension.

The incidence of diabetes mellitus

The incidence of diabetes mellitus picture obtained from the respondents in the study can be depicted in Table 3.

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Table 3 Figure of the Events of Diabetes Mellitus

No	The incidence of diabetes mellitus	Frequency	Percentage (%)
1	Non-Diabetes Mellitus	18	25,7
2	Diabetes Mellitus	52	74,3
Total		70	100,0

Based on Table 3, it can be informed that the incidence of diabetes mellitus of 70 respondents, most respondents (74.3%) suffer diabetes mellitus.

Relationship of Characteristics of Individuals with Diabetes Mellitus

The following is the result of an analysis of the relationship between individual characteristics based on the respondent's anger and the incidence of diabetes mellitus.

Table 4 Relationship between Age with Diabetes Mellitus

No.	Age	Diabetes Mellitus				Total	
		DM		Non-DM			
		n	%	n	%	n	%
1	< 50 years	10	38,5	16	61,5	26	100,0
2	> 50 years	42	95,5	2	4,5	44	100,0
Total		52	74,3	18	25,7	70	100,0
Continuity Correction = 0,001 (< 0,05);		*Cramer's V = 0,630;*		*Odds Ratio = 0,030*			

Based on Table 4 above, can be informed that people age more than 50 years has more risk of diabetes at 95.5%. Statistically, through the assessment of the Continuity Correction indicator in chi-square, it can be seen that there was a significant relationship between the respondents' age and the incidence of diabetes mellitus (p = 0.001) and the strength of the relationship that occurs is quite strong (Cramer's V = 0.630). While this reading of the results through Odds Ratio (OR) can be seen that people age more than 50 years would have a risk of developing diabetes by 0,03x than people age under 50 years.

The following is the analysis result of the relationship between individual characteristics based on the sex of the respondent and the incidence of diabetes mellitus.

Table 5 Relationship between Gender and Diabetes Mellitus

No.	Gender	Diabetes Mellitus				Total	
		DM		Non-DM			
		n	%	n	%	n	%
1	Men	11	44,0	14	56,0	25	100,0
2	Women	41	91,1	4	8,9	45	100,0
Total		52	74,3	18	25,7	70	100,0
Continuity Correction = 0,001 (< 0,05);		*Cramer's V = 0,516;*		*Odds Ratio = 0,077*			

Based on Table 5 above, it can be informed that a woman has more risk of DM by 91.1%. Statistically, through the assessment of the Continuity Correction indicator in chi-square, it can be seen that there was a significant relationship

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between the sex of the respondent and the incidence of diabetes mellitus (p = 0.001 <Alpha) and the strength of the relationship is quite strong (Cramer's V = 0.516). While the way to read the results through Odds Ratio (OR) can be seen that a woman has a risk of DM disease by 0.077x compared to a man.

The following is the analysis result of the relationship between individual characteristics based on respondents' smoking activities and the incidence of diabetes mellitus.

Table 6 Relationship between Smoking Activity with Diabetes Mellitus

No.	Smoking Activity	Diabetes Mellitus				Total	
		DM		Non-DM			
		n	%	n	%	n	%
1	Yes	10	71,4	4	28,6	14	100,0
2	Has Stopped	5	71,4	2	28,6	7	100,0
3	Not	13	26,5	36	73,5	49	100,0
Total		52	74,3	18	25,7	70	100,0
Pearson Chi-Square = 0,002 (< 0,05);		*Cramer's V* = 0,420					

Based on Table 6 above, it can be informed that a person who has a history of smoking activity, especially still active smoking can be at risk of DM by 71.4%. Statistically, through the assessment of the Pearson Chi-Square indicator in chi-square, it can be seen that there was a significant relationship between the smoking activity of the respondents and the incidence of diabetes mellitus (p = 0.002 <Alpha) and the strength of the relationship that occurs is quite strong (Cramer's V = 0.420)

Relationship between Blood Pressure and Diabetes Mellitus

The following is the analysis result of the relationship between the blood pressure of respondents with diabetes mellitus.

Table 7 Relationship Blood Pressure with Diabetes Mellitus

No.	Blood Pressure	Diabetes Mellitus				Total	
		DM		Non-DM			
		n	%	n	%	n	%
1	Hypertension	18	94,7	1	5,3	19	100,0
2	Non-Hypertension	34	66,7	17	33,3	51	100,0
Total		52	74,3	18	25,7	70	100,0
Fisher's Exact Test = 0,016 (< 0,05);		*Cramer's V = 0,286;*		*Odds Ratio = 9,000*			

Based on Table 7 above, it can be informed that people who have a history of hypertension, will be at risk of DM by 94.7%. In OR it can be seen that someone who has a history of hypertension will be at risk of DM by 9x compared to someone who has no history of hypertension.

IV. CONCLUSION

Age has a significant relationship with DM disease. People age more than 50 years would be at risk of DM 0,03x compared with people age less than 50 years. Sexes have a significant relationship with DM. Women will be at risk of the DM 0.077x compared with men. A smoking activity has a significant relationship with DM. People who have a history of

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smoking, especially still active smoking can be at risk of DM. Blood pressure has a significant relationship with the incidence of DM. People who have a history of hypertension would be at risk of developing diabetes disease by 9x compared to those without a history of hypertension.

Prevention and control of diabetes mellitus are needed to reduce the incidence of diabetes mellitus and prevent its complications. Therefore, a person must always maintain the quality of life by arranging a lifestyle into a healthy lifestyle. Besides that, promotive and preventive efforts must be kept firm by diligently checking the early possibility of diabetes mellitus, properly routine and periodic visits to doctors or health services, seeking the right information, maintain the spirit of life and have good support from family and environment.

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