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RESEARCH ARTICLE

ANALYSIS RELATIONSHIP BETWEEN AGE, SEX, DIABETES MELLITUS (DM) HISTORY AND SUGAR LEVELS WITH BLOOD PRESSURE TYPE II DM PATIENTS BASED ON MEDICAL RECORD DATA OF DM PATIENTS

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ABSTRACT

Hypertension Type 2 diabetes is a type of diabetes mellitus whose symptoms are caused by high blood sugar (glucose) levels. This disease is also referred to as adult-onset diabetes because it usually affects adults or the elderly. In contrast to type 1 diabetes, which can attack younger people, such as children. Diabetes mellitus type2 is a chronic disease caused by the body not being able to use insulin effectively. The prevalence of type 2 diabetes increases with age and an unhealthy lifestyle. Uncontrolled blood sugar levels of type 2 diabetes can lead to various complications in type 2 diabetes sufferers, one of which occurs macroangiopathy, which is complications in large blood vessels that affect changes in blood pressure. Type 2 diabetes mellitus often does not show obvious symptoms of diabetes. The purpose of this study was to determine the relationship between blood glucose levels and blood pressure in elderly patients. MethodIn this study, using the association test with the contingency coefficient method using the SSSS version 27 analysis tool. The data used as sample data is medical record data for 2019 based on medical record data for 1 year in RSUD Dr. SoerotoNgawi. The results of the study showed a relationship between blood pressure and sugar levels in people with diabetes mellitus. Test using a contingency coefficient with test results is 0.116 with a significance value of 0.026. This means that there is a relationship between blood pressure and sugar levels in people with diabetes mellitus.

INTRODUCTION

Diabetes mellitus (DM) is a collection of metabolic diseases characterized by hyperglycemia due to impaired insulin secretion, insulin performance, or both. Diabetes mellitus type 2 is a condition when blood sugar in the body is not controlled due to the impaired sensitivity of pancreatic cells βto produce the hormone insulin(Priscilla LeMone, RN, DSN, FAAn, Karen M. Burke, RN, MS, Gerene Bauldoff, RN, PhD, 2016). Insulin functions to regulate the balance of sugar levels in the blood, but if glucose/carbohydrate intake is too much, insulin is not able to balance blood sugar levels and hyperglycemia occurs. Patients diagnosed with DM need long treatment therapy to reduce the incidence of complications("High Blood Pressure | ADA," n.d.). Type 2 diabetes is diabetes that occurs in adulthood and accounts for 80% of diabetes mellitus as a whole. The prevalence of type 2 diabetes increases with age and changes in lifestyles that tend to be unhealthy. Indonesia ranks 7th with as many as 8.5 million DM sufferers (Unwin, 2009). WHO predicts an increase in the number of people with diabetes mellitus in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030, while the International Diabetes Federation (IDF) in 2009 estimates an increase in the number of people with diabetes mellitus from 7.0 million years 2009 to 12.0 million in 2030("RI Ranking Keempat Jumlah Penderita Diabetes Terbanyak Dunia," n.d.). Based on data from the Central Bureau of Statistics (BPS), the number of people with diabetes in 2003 was 13.7 million people and based on the population growth pattern it is estimated that in 2030 there are 20.1 million people with diabetes with a prevalence rate of 14.7% for urban areas and 7.2. % in rural areas (Priscilla LeMone, RN, DSN, FAAn, Karen M. Burke, RN, MS, Gerene Bauldoff, RN, PhD, 2016). Based on research by(Khairani, 2016) the prevalence of type 2 diabetes mellitus is 15.8% and all of them are found in the 60-70 year age group and not found in the elderly above the age of 70 years. Type 2 diabetes is caused by 2 things, namely a decrease in the response of peripheral tissues to insulin (insulin resistance) and a decrease in the ability of pancreas cells to secrete insulin in response to glucose loads. Most cases of type 2 diabetes begin with obesity so that the pancreas β cells respond by secreting more insulin, resulting in hyperinsulinemia. High insulin causes insulin receptors to attempt to regulate themselves by reducing the number of receptors. This has an impact on decreasing the receptor response and further resulting in insulin resistance, this hyperinsulinemia condition can lead to receptor

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desensitization. In insulin resistance, there is an increase in glucose production and a decrease in glucose use, resulting in hyperglycemia (Priscilla LeMone, RN, DSN, FAAn, Karen M. Burke, RN, MS, Gerene Bauldoff, RN, PhD, 2016). According to Setiyorini, Wulandari, & Efyuwinta (2018) diabetes mellitus, which is characterized by hyperglycemia, is a risk factor for hypertension. Based on the ADA, two out of 3 people with diabetes mellitus have high blood pressure. Cheung & Li (2012) stated that hyperglycemia is often accompanied by the onset of metabolic syndrome, namely hypertension, dyslipidemia, obesity, endothelial dysfunction, and prothrombotic factors, all of which will trigger and aggravate cardiovascular complications. One of the complications of diabetic macroangiopathy can occur due to changes in blood sugar levels, high blood sugar will stick to the walls of blood vessels. After that, there is an oxidation process in which blood sugar reacts with proteins from the walls of blood vessels to give rise to AGEs. Advanced Glycosylated Endproducts (AGEs) are substances that are formed from excess sugar and protein bonding together. This condition damages the inner walls of blood vessels and attracts saturated fat or cholesterol to stick to the walls of blood vessels, causing an inflammatory reaction to occur. White blood cells (leukocytes) and blood clotting cells (thrombocytes) and other materials join together to form a plaque (plaque), which makes the walls of blood vessels hard, stiff and eventually a blockage occurs which results in changes in blood pressure called hypertension (Muhammad & Faridha, 2013). Setiyorini *et al*., (2018) in a previous study showed a relationship between blood sugar levels and hypertension in people with type 2 diabetes mellitus. Paramitha (2014) in his research stated that there was no significant relationship between blood sugar levels at the time with systolic area pressure and diastolic blood pressure.

RESEARCH METHODS

This research method uses the association test with the contingency coefficient method. The independent variable in this study was blood sugar levels in medical record data with the sexes of women and men, aged <40 years and> 60 years, and having a history of diabetes or not. The population in this study were all type 2 diabetes sufferers who came to Dr. Soeroto Ngawi. Average Number of Gender: Male 128 and Female 234;Age: <40 years as many as 14, 40 - 50 years, 50 - 60 years as many as 132 as many as 46, and>60 years as many as 170. The sample size used the calculation of the Isaac & Michael formula as many as 300 people. The statistical test used to determine the relationship between blood sugar levels and blood pressure in elderly people with type 2 diabetes is using the SPSS version 27 statistical test.

RESULT AND DISCUSSION

Most of the type II DM patients at Soeroto Ngawi Hospital were female (65%), were more than 50 years old (83%), and had a family history of DM (64%). Based on research by Yan et.al. Fat levels in women range from 20-25% of body weight, while in men 15-20%. The increase in blood lipid levels in women is higher than in men. So the risk of developing DM in women is 3-7 times higher than that of men. In addition, there are factors that cause a person to be at high risk of suffering from diabetes, namely elderly age and a history of DM.

Table 1. Manual Patient Data Management

No	Patient Data	N	%
1.	Gender:		
	●Male	128	35
	●Female	234	65
2.	Age:		
	●<40 years	13	3
	●40 - 50 years	46	13
	●50 - 60 years	132	36
	●> 60 years	171	47
3.	DM history:		
	●Yes	231	64
	●No	131	36

Table 2. Contingency Coefficient Test

Variable	Hypertention	Non Hypertention	Value-Test	P-value
Gender:			0.039	0.461
●Male	61	67		
●Female	21	113		
Age:			0.157	
●<40 years	3	10		0.027
●40 -50 years	18	28		
●50 -60 years	64	68		
●> 60 years	7	74		
DM history:			0.044	0.398
●Yes	120	111		
●No	62	69		
Fasting blood glucose			0.116	0.026
>=	174	161		
< 200	8	19		

Based on table 2, sugar levels are related to blood pressure in patients with type II diabetes (p-value 0.027). This means that it indicates that the sugar levels of type II DM patients can cause an increase in blood pressure. Because of the relationship between blood pressure and sugar levels, DM sufferers must pay attention to the sugar levels and blood pressure within normal limits so that there are no complications. Because there is a relationship between blood sugar levels and blood pressure, the characteristics of risk factors for disease are similar. Insulin resistance and hyperinsulinemia in DM sufferers are believed to increase peripheral vascular resistance and vascular smooth muscle contractility through excessive response to norepinephrine and angiotensin II.

This condition causes an increase in blood pressure through physiological feedback mechanisms and the Renin-Angiotensin-Aldosterone system. Hyperglycemia in DM patients also induces overexpression of fibronectin and collagen IV which triggers endothelial dysfunction as well as thickening of the glomerular basement membrane which results in kidney disease. Controlling blood sugar levels will of course also control the patient's blood pressure. The presence of comorbid type 2 diabetes as a comorbid disease is a risk factor for uncontrolled hypertension. In addition, blood pressure in type II DM patients is also influenced by age (p-value 0.027). This means that increasing age increases the risk of developing hypertension. Increasing age causes physiological changes in the body, such as thickening of the uterine wall due to a buildup of collagen in the muscle layer, so that blood vessels narrow and become stiff starting at the age of 45 years. There is also an increase in peripheral resistance and sympathetic activity as well as a lack of baroreceptor sensitivity (blood pressure regulator and the role of stool, blood flow and glomerular filtration rate).

Conclusion

The results showed that there was a relationship between sugar levels and blood pressure in type II DM patients in DM Soeroto Ngawi Hospital. Age also affects blood pressure in people with type II diabetes.

Suggestion

Patients with type II diabetes must maintain blood glucose levels by adopting a healthy lifestyle, reducing consumption of foods that can trigger hypertension.

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