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Major Risk Factors for Gestational Glucose Intolerance and Gestational Diabetes Mellitus in Urban Areas of Jember

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ABSTRACT

Gestational Glucose Intolerance (GGI) and Gestational Diabetes Mellitus (GDM) is condition in which someone who leads to abnormally higher blood glucose levels. High glucose level on pregnant can influence mother itself and her fetus if it doesn't get prevention and right treatment. The purpose of this research was to know modified risk factors related with incidence of GGI and GDM in urban areas of Jember. This research was observational with cross sectional approach. Non probability sampling using purposive sampling was used in this research as sampling technique. Data were collected by interview and questionnaire that was distributed for 96 pregnant women who have been checked their blood glucose level in urban areas of Jember. The result of this research showed that over weight (p value= 0.001, OR= 16.15), less physical activities (p value = 0.000, OR=4.91) and unhealthy diet (p value = 0.000 OR=5.3) have significant correlation with GGI and GDM, while less physical activity (p value = 0.000 OR=0.176) as major risks with incidence of GGI and GDM. Pregnant women should do physical activities, like doing light exercises in accordance with their condition are offset by keeping dietary habits, so the blood glucose level during pregnancy could be controlled.

Keywords: GGI, GDM, High glucose level, Overweight, Less physical activities, Unhealthy diet

INTRODUCTION

Background

Gestational Diabetes Mellitus (GDM) is defined as intolerance glucose disorder which first recognition during pregnancy(1). Gestational Glucose Intolerance (GGI) is defined as condition of blood glucose level between normal limit and limit with GDM(2). Pregnant women with GDM have characteristic that woman without diabetes develops high blood glucose levels during pregnancy. This condition commonly happened during 24 weeks pregnancy and it will back to normal condition during 6 weeks after birth(3). The incidence of GGI and GDM are influenced by hormonal changing and metabolism on pregnant women. Metabolism changing is signed by increasing of blood glucose levels as effect of fulfillment energy needs for mother and her fetus. Increasing of estrogen, progesterone, hPL, and cortisol are caused condition of number and insulin function on mother was not optimum and insulin kinetic will change and resistance on insulin effect(4). This condition can influence fetus, because mothers' blood glucose levels will influence increasing blood glucose levels of her babies born.

Pregnant women have potential preeclampsia about 10-30% on gestational diabetes mellitus. Caused of preeclampsia on pregnancies with GDM is unknown clearly. Some studies showed that mother with history of diabetes that has protein in urine caused diabetes neuropathy complication (kidney illness) four times increasingly risks preeclampsia development(5). International Diabetes Federation (IDF) estimated 20.9 million or 16.2 % live birth in 2015 have hyperglycemias on pregnancy and 85.1% estimated were caused by gestational diabetes, 7.4% due to other kind of diabetes which firstly detected during pregnancy, and 7.5% because of diabetes is detected before pregnancy(6).

Purpose

Prevention program for diabetes mellitus in Indonesia is considered very important as prevention program of risk factors to reduce morbidities, disabilities, and dead on pregnant women caused by diabetes mellitus. There are two factors that caused high blood sugar level on pregnancies such as modified factors and unmodified risk

factors[7]. Modified risk factors for research variable in this research such as overweight during pregnancy > 24 weeks, less physical activities, hypertension (> 140/90), unhealthy and unbalanced diet (high calories level) and dyslipidemia HDL <35 mg / dL and or triglycerides > 250 mg / dL). Prevention of risk factors, especially on modified risk factors is can be done early, so prevalence of GDM and complication that will occur can be minimized[7].

Based on prior studies in public health centers, laboratory examination was only done once when their pregnancy examination first trimester covered Hemoglobin, blood type, urine protein, and PPIA or laboratory examination which are done if there is indication. Insulin resistance commonly occurs during pregnancy more than 24 weeks and in this period didn't take repeat examination, so it can be said that prevention efforts on pregnancies for incidence of GDM was considered poor attention.

Urban lifestyles factor that create unhealthy habits such as eating high fat foods, sugar and salt, less vegetables and fruits, smoking habit, consume alcohol, stress, and less physical activities were modified risk factors of diabetes mellitus[8]. A research that was done by Suastika (2011) stated that diabetes mellitus patients in urban society in Bali has higher prevalence and higher in national level than in village[9]. In Indonesia itself, especially in Jember district there has never research yet that discuss about incidence of gestational diabetes mellitus and its factors, mostly in this research only discussed incidence of DM in general. Thus condition above was underlying research about risk factors of GGI and GDM in Jember.

METHODS

This research was observational analysis rough quantitative approach with crossectional design. Samples in this research were pregnant women during 24 weeks pregnancy who examine their pregnancy in three work areas of public health center in Kaliwates, Sumbersari, and Patrang were 96 pregnancies. Non probability sampling was used in this research to take samples using purposive sampling based on inclusion and exclusion criteria that was made by researcher. The inclusion criteria were: 1) willing to be respondent and stay in three work areas of public health center in Kaliwates, Sumbersari, and Patrang, 2) age of pregnant woman ≤ 30 years old, 3) gestational age ≥ 24 weeks, 4) pregnant woman has been controlled her own blood sugar one step procedure; while the exclusion criteria were: 1) has prior history of miscarriage or loss of pregnancy, 2) has family history of diabetes (children with diabetes), 3) has history of childbirth for baby weight >4000 gram or with history of GDM, 4) has history of low birth weight, less than 2.5 kg, 5) has prior history of others diabetes mellitus, 6) has history of Polycystic Ovary Syndrome (PCOS), 6) has prior history of metabolic syndrome (glucose tolerance disorder, stroke, CHD, PAD (Peripheral Arterial Diseases).

Dependent variables in this research were gestational glukosa intolerance (GGI) and gestational diabetes mellitus (GDM), while independent variables were overweight, less physical activity, hypertension, unhealthy diet (high calories), and smoking. Data collection method was suggest pregnant women to fasting 2 hours, then was done examination of blood pressure and measuring weight and also answer questionnaires and 24 hours food recall, after 2 hours pregnancies were examined their glucose levels. After all data were collected, researchers doing processing data through some steps to check the accuracy and completeness data. Data analysis was done in three steps such as descriptive analysis, chi square, and multiple logistic regression.

RESULTS

Respondent characteristic was 20-30 years old (76.1%), Madurese (58.3%) and their last education was Senior High School (58.3%). Respondents distribution on table 2 could be seen that pregnant women with GGI and GDM were 57% with overweight respondent 18.8%, less physical activity 60.4%, hypertension 3.9%, unhealthy diet 54.2% and smoking (active and passive smokers) 59.4% on pregnant women in rural areas of Jember.

Table 1. Demography Characteristics

Characteristics	Classification	Frequency	Percentage
1. Age	1. <20 years	22	22.9
	2. 20-30 years	74	76.1
2. Ethnic	1. Javanese	34	33.4
	2. Madurese	56	58.3
	3. Etc.	6	6.3
3. Last Education	1. Elementary School	7	7.2
	2. Junior High School	18	18.8
	3. Senior High School	56	58.3
	4. University	15	15.7

Table 2. Distribution Variable

Characteristic	Classification	Frequency	Percentage
1. GGI and GDM	1. Yes	57	59.4
	2. No	39	40.6
2. Overweight	1. Yes	18	18.8
	2. No	78	81.2
3. Less Physical Activity	1. Yes	58	60.4
	2. No	38	39.6
4. Hypertension	1. Yes	3	3.9
	2. No	96	96.1
5. Unhealthy Diet	1. Yes	44	45.8
	2. No	52	54.2
6. Smoking	1. Yes	57	59.4
	2. No	39	40.6

Table 3. Classification of GGI and GDM

Classification	Frequency	Percentage
1. GGI	44	77.2
2. GDM	13	22.8
Total	57	100

Table 4. Result of Chi square test

	GGI and GDM							
	Yes		No		Total		OR	P value
	n	%	n	%	n	%		
Overweight								
Yes	17	94.4	1	5,6	18	100	16.50	
No	40	51.3	38	48.7	78	100	(2.048-127.36)	0.001
Less Physical Activity								
Yes	43	74.1	15	25.9	58	100	4.914	
No	14	36.8	24	63.2	38	100	(2.032-11.885)	0.000
Hypertension								
Yes	3	100	0	0	3	100		0.145
No	54	58.1	39	41.9	93	100		
Unhealthy Diet (high calories)								
Yes	35	79.5	9	20.5	44	100	5.303	
No	22	42.3	30	57.7	52	100	(2.122-13.355)	0.000
Smoking (Smoker)								
Yes	34	59.6	23	40.4	57	100	1.028	
							(0.449-2.356)	0.947

Based on table 3, variable that has significant correlation with GGI and GDM was birth weight (p value= 0.000, OR=16.15), less physical activities (p value=0.000, OR= 4.91) and unhealthy diet (p value=0.000, OR= 5.3).

Based on table 4, after last modeling was done, it showed that less physical activity has p value=0.000 and OR=0.176 it means that less physical activity as major factor that influenced on incidence of IGG and GDM than others.

DISCUSSION

Pregnant women have been categorized in GGI and GDM were 57 people (59.4%) with details pregnant women were categorized in GGI 44 people and pregnant women with GDM were 13 people. Classification of pregnant women based on criterion DIPSI of India which has been categorized blood glucose levels of GGI was120-139 mg/dl and GDM was140-199 mg/dl. So, most of e pregnant women sowed pre diabetes or it is called pregnant women leads to GDM or complication if it didn't do controlling of blood glucose levels well. Some efforts for pregnant women with GGI and GMD that can be done by doing prevention on modified risk factor

based on Kemenkes (2014) such as overweight, less physical activities, hypertension, unhealthy diet, and smoking habit[7].

Overweight has a significant correlation with incidence of GGI and GDM. Overweight has OR=16.15, It means that overweight has opportunities 16.15 times for incidence of GGI and GDM. Obesity is predisposition factors for improvement of blood glucose level, it due to several things such as beta- cell islet of Langerhans become lack of stimulation or because of increasingly glucose levels and obesity also will compress the amount of insulin receptor on body cells. A woman who before pregnancy had overweight or obesity was known for higher gestational diabetes risks. Weight is important to keep in normal limit before pregnancy[6].

The correlation between less physical activities and incidence of GGI and GDM could be seen on p value = 0.001, it means that pregnant women who have less physical activity have significant correlation with incidence of GGI and GDM. While, OR value = 4.91, it means that pregnant women with less physical activity has opportunity 4.91 times on incidence of GGI and GDM. Exercises can help working of metabolism that can cause diminished of insulin needs and exercises could help reducing blood glucose levels. Exercises which done regularly caused muscles can absorb glucose 20 times from average, so blood glucose levels will decrease. Research done by Rahmawati (2010) about the correlation between physical exercises and blood glucose levels on diabetes showed that from 40 out of 42 research subjects there were decrease of blood glucose significantly (p <0.000) after doing physical exercises 30 minutes (post-test) than blood glucose level before doing physical exercises (pre-test)[10].

There was no significant correlation noted between hypertension and incidence of GGI and GDM. Diabetes on pregnant women can occur because of hypertension itself influences insulin secretion in pancreas, so it improve blood glucose levels. However, in this research hypertension was not become risk factors that has correlation with incidence of GGI and GDM. There were some possibilities sample number in this research was a few pregnant women with hypertension only 3 person and those pregnant women also categorized in GGI and GDM.

Pregnant woman who have unhealthy diet has significant correlation with incidence of GGI and GDM. Increasing of blood glucose levels is commonly happened after consumes high calories food. Carbohydrates give big influence on blood glucose levels, it's not means that never consumes carbohydrates, but more carefully when choose kind of carbohydrates. Complex carbohydrates and have high fiber are more recommended due to it will later breaking down by digestive systems, so blood glucose level in the body is consistent. Diet low fat, especially food that contain high cholesterol is important to be noticed. High cholesterol levels can increase fatty acid will destroy pancreas beta-cells and cause blood glucose levels uncontrolled[3].

Last variable was smoking; the result of in this research showed that pregnant women as active smoker or passive smokers were not have significant correlation with incidence of GGI and GDM, but smoking has opportunity 1.028 times incidence of GGI and GDM. In this research, researcher categorized pregnant women who ever smoking (active and passive smokers) in 1 last year, pregnant women who ever smoking but during their pregnant stop smoking. Based on data and Coronary Artery Risk Development in Young Adults Study, active and passive smokers have correlation on increasing of glucose intolerance risks. Result of this research showed that incidence of glucose intolerance as follow; smoker (21.8%), smoker but passive (17.2%), not smokers (14.4%) and not passive smoker (11.5%)[11]. The influence of nicotine on insulin such as cause decrease of insulin released was caused activation of catecholamine, negative influence on insulin work, β cell pancreas disorder, and development tends to insulin resistance. Diabetes risk on active and passive smokers have same levels, and both of them have higher hemoglobin A1C levels than non-smokers[12].

Some of risk factors variables were researched in order to know the major risk factors that influence incidence of GGI and GDM. In table 4.18 the result showed that less physical activity as the major risk factor for incidence of GGI and GDM or higher blood glucose levels in body. Less physical activity has opportunity 0.176 times for GGI and GDM than overweight variable with opportunity 0.051 times. Less of physical activity, especially for pregnant women more happened due to increasing of uterus volume and physiology changing that caused pregnant women easier to feel exhausted, so lower physical activity and tends to do sedentary activities. Sedentary activities on pregnant women like watching television more and being lazy. Therefore, pregnant women should do early prevention by doing light exercises such as jogging or gymnastics, and do health diet. Health workers also should give more specific attention about GDM due to this disease has more serious complication if it doesn't get a prevention and right treatment.

CONCLUSION

The result of this research showed that risk factors that can be modified which related with incidence of gestational glucose intolerance and gestational diabetes mellitus in urban areas of Jember was overweight, less physical activities, and unhealthy dietary habits. Major factor which has influence on incidence of GGI and GDM in urban areas of Jember was less physical activities.

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