HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
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ANALYSIS OF RISK FACTORS THAT AFFECTING GESTATIONAL DIABETES MELLITUS ON PREGNANT WOMEN IN PUBLIC HEALTH CENTER OF MALANG REGENCY

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ABSTRACT

One of GDM (Gestational Diabetes Mellitus) symptoms is a condition of hyperglycemia. Usually begins at 24 weeks and mostly patients return to normal after giving birth (Depkes, 2008), but almost half of the several occurrence, diabetes will reappear (Nurrahmani 2012 in Saldah 2012. The purpose of this study was to analyze the relationship between factor of family history suffer in DM, gave birth a macrosomia baby, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths) against the risk of gestational diabetes mellitus in Public Health Center of Malang Regency.

Design of analytic observational study with cross sectional approach. The study population was pregnant women who had antenatal care at the Public Health Center of Malang Regency, total 50 people, samples were taken using purposive sampling technique that were 30 people. The dependent variable of research is the risk of GDM, the independent variable is the observed risk factor is family history of diabetes mellitus, gave birth a macrosomia baby, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths). Collecting data using interview techniques, documentation of ANC (antenatal care). Univariate data analysis using the formula percentage while bivariate analysis using chi-square and multivariate analysis using logistic regression with α of 0.05.

The result of the analysis obtained simultaneous testing obtained value of Chi square (16.660) more than the value of chi square table with db=3 (7.815) or the significance value (0.001) is less than alpha (0.050) thus there is significant influence between had given birth a macrosomia baby, family history with diabetes, and gestational diabetes mellitus obesity on simultaneously. Coefficient of determination of the influence of ever having a macrosomia baby, family history of diabetes, and gestational diabetes mellitus obesity on the basis of scoring Negelkerke R Square of 0.568. It showed that 56.8 per cent of the occurrence of gestational diabetes mellitus had given birth a baby affected by macrosomia, family history of diabetes, and obesity.

Based on the research, pregnant women can take early preventive action through marital consultant, simultaneously antenatal care and early detection of risk factors. While health officials are expected to conduct screening of pregnant women and monitoring of cases of pregnant women at risk.

Keywords: **risk factors, gestational diabetes mellitus**

Introduction

Gestational Diabetes Mellitus (GDM) is a public health problem because this disease has a direct impact on the health of the mother and fetus (Osgood et al, 2011). GDM is glucose intolerance that begins or identified the first time during pregnancy progresses. One marker of the GDM is a condition of hyperglycemia. Hyperglycemia in pregnancy is a metabolic disorder during pregnancy and this can develop into insulin resistance during pregnancy (Diabetes Voice, IDF, June 2014). The above condition usually begins at 24 weeks and in most patients return to normal after giving birth (Depkes, 2008), but almost half of several occurrences, diabetes will reappear (Nurrahmani 2012 in Saldah 2012). Based on interviews with several midwives stated that GDM screening is rarely done if

there are no indications or complaints from patients, even though there is a family history of DM.

Pregnancy is a diabetogenic conditions because the placenta secretoring hormones such as progesterone, cortisol, lactogen, placenta, prolactin and growth hormone, which is a major contributor to insulin resistance seen in pregnancy. Insulin resistance usually begins in the second trimester and go forward to the rest of the pregnancy. Pregnant women suffering from DMG can increase morbidity fetus will be born. The complications included fetal macrosomia, congenital abnormalities, hyperbilirubinemia, respiratory distress syndrome and shoulder distocia there by increasing the birth of a baby with sectio caesaria (David R, et al, 2010). Pregnant women with hyperglycemia can make the fetus in the womb experience hyperinsulinemia so that the baby can experience neonatal hypoglycemia a few hours after birth and this will have an impact in the long term the baby has an increased risk of glucose intolerance.

Pregnant women with gestational diabetes mellitus (GDM) almost never feel the complaint, early detection is necessary for pregnant women at risk can be managed as well as possible, so as to improve the welfare of the mother and baby, in addition to the incidence of diabetes mellitus (DM) can be suppressed (Metris, 2013). The risk assessment in pregnant women should be done during the first antenatal care and for pregnant women with consistent characteristics of the risk for GDM should be tested as soon as possible. The purpose of this study was to analyze the relationship between the factor a family history of diabetes mellitus, gave birth to a baby macrosomia, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths) against the risk of gestational diabetes mellitus in Public Health Center of Malang Regency.

Research methods

The study design was observational analytic with cross sectional approach. The population in the study were pregnant women who had antenatal care Clinic of Malang Regency regency, some 50 pregnant women. Samples were taken by purposive sampling technique with a sample size of 30 people. The research variables consist of independent variables, the risk of gestational diabetes, while the dependent variable is a family history of diabetes mellitus, gave birth to a baby macrosomia, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths). The data collection begins with a consideration of the research ethics board of examiners eligible to consider and implement ethical clearance between researchers with research subjects. Collecting data in this study using interview techniques whereby draft instrument interviews made in the form of questionnaires, documentation ANC (antenatal care). Data were analyzed by univariate, bivariate with chi square and multivariate logistic regression test, using a 95% confidence interval.

Research Result

Based on the results support the general data as follows the majority of respondents in both groups were 21-30 years of age are stretched or reproductive age, the amount of risk groups (86.6%) and control group (80%). The education level of respondents in both groups were high school is at-risk groups (60%) and the control group (53.3%) this gives the meaning that the respondents have secondary education, making them easier to absorb the information. Employment status of respondents in both groups almost the whole is a homemaker tanggga / not working so it's status monthly income respondents also almost a whole is not income. Most of the respondents already have health insurance in the form of BPJS especially at risk group number (60%), while the control group had health insurance only (40%).

Table 1

Frequency Distribution of Gestational Diabetes Mellitus (GDM) Risk Factors on Respondents in Public Health Center

of Malang Regency

No.	Status Obstetrics	Risk Groups (+)		Risk/Control Groups (-)	
		Σ	%	Σ	%
1.	Age Pregnancy (Week)				
	24-28	0	0	3	20
	29-33	8	53.3	4	26.7
	34-38	5	33.3	8	53.3
	> 38	2	13.3	0	0
Total		15	100	15	100
2.	Pregnancy to				
	Primigravidae	0	0	8	53.3
	Multigravidae	15	100	7	46.7
Total		15	100	15	100
3.	Frequency of ANC				
	Regular	15	100	14	93.3
	Irregular	0	0	1	6.7
Total		15	100	15	100

Based on the above table shows that the overall risk groups showed respondents are multigravida and regularly ANC amount (100%) and the majority of 29-33 weeks gestational age (53.3%), whereas the control group showed mostly primigravidae with gestational age 34 -38 weeks (53.3%) and the frequency of regular ANC (93.3%)

Table 2

Cross Tabulation of Variable that Ever Giving Birth a Macrosomia Baby with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Ever Giving Birth Macrosomia Baby	No	Count	12	5	17
		% Within GDM	80.0%	33.3%	56.7%
	Yes	Count	3	10	13
		% Within GDM	20.0%	66.7%	43.3%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 1 note that of the 15 people who did not have gestational diabetes mellitus there are 12 people or 80% were never delivered a baby macrosomia and 3 people or 20% who had delivered a baby macrosomia. Then from 15 people who experience gestational diabetes mellitus there are 5 people or 33.3% who have never given birth ≥ 4000 g and 10 people or 66.7% who had given birth a macrosomia baby.

Table 3

Cross Tabulation of Pre/eclampsia History Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Pre/ eclampsia History	No	Count	14	12	26
		% Within GDM	93.3%	80.0%	86.7%
	Yes	Count	1	3	4
		% Within GDM	6.7%	20.0%	13.3%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 2 that of the 15 people who did not have gestational diabetes mellitus there are 14 people or 93.3% do not have a history of pre/eclampsia and 1 or 6.7% have a history of pre/eclampsia. Then from 15 people who experience gestational diabetes mellitus there are 12 people or 80.0% do not have a history of pre/eclampsia and 3 people or 20% had a history of pre/eclampsia.

Table 4

Cross Tabulation of Recurrent Abortion History Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Recurrent Abortion History	No	Count	13	10	23
		% Within GDM	86.7%	66.7%	76.7%
	Yes	Count	2	5	7
		% Within GDM	13.3%	33.3%	23.3%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on the table above it is known that of the 15 people who did not experience Gestational Diabetes Mellitus there were 13 people or 86.7% did not have a history of recurrent abortion and 2 people or 13.3% had a history of recurrent abortion. Then out of 15 people who have Gestational Diabetes

Mellitus there are 10 people or 66.7% do not have a history of recurrent abortion and 5 people or 33.3% have a history of recurrent abortion.

Table 5

Cross Tabulation of IUFD History Variable with Gestational Diabetes Mellitus

			GDM		Total
			morbidly	Yes	
IUFD History	No	Count	14	13	27
		% Within GDM	93.3%	86.7%	90.0%
	Yes	Count	1	2	3
		% Within GDM	6.7%	13.3%	10.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on table 5 note that of the 15 people who did not have gestational diabetes mellitus there are 14 people or 93.3% do not have a history of IUFD and 1 or 6.7% had a history of IUFD. Then from 15 people who experience gestational diabetes mellitus, there were 13 people or 86.7% do not have a history of IUFD and 2 or 13.3% had a history of IUFD.

table 6

Cross tabulation variables with DM Family History with gestational Diabetes mellitus

			GDM		Total
			No	Yes	
Kelg history. by DM	No	Count	11	1	12
		% Within GDM	73.3%	6.7%	40.0%
	Yes	Count	4	14	18
		% Within GDM	26.7%	93.3%	60.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on table 6 note that of the 15 people who did not have gestational diabetes mellitus there are 11 people or 73.3% do not have a family history of diabetes and 4 people, or 26.7% had a family history of diabetes. Then from 15 people who have Gestational Diabetes Mellitus is 1 or 6.7% did not have a family history of diabetes and 14 people or 93.3% had a family history of diabetes.

Table 7

Cross Tabulation of DM Previous History Variables with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
DM Previous History	No	Count	15	12	27
		% Within GDM	100.0%	80.0%	90.0%
	Yes	Count	0	3	3
		% Within GDM	0.0%	20.0%	10.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 7 note that of the 15 people who did not have gestational diabetes mellitus there are 15 people or 100.0 per cent do not have a disease previous DM and 0 persons or 0.0% had preexisting diabetes disease. Then from 15 people who experience gestational diabetes mellitus there are 12 people or 80.0% do not have a disease previous DM and 3 people or 20.0% had preexisting diabetes disease.

Table 8

Cross Tabulation of Age> 35 years old Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Age> 35 years old	No	Count	15	13	28
		% Within GDM	100.0%	86.7%	93.3%
	Yes	Count	0	2	2
		% Within GDM	0.0%	13.3%	6.7%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 8 note that of the 15 people who did not have gestational diabetes mellitus there are 15 people or 100% are not aged> 35 years and 0 or 0.0% of people aged> 35 years. Then from 15 people who experience gestational diabetes mellitus, there were 13 people or 86.7% are not aged> 35 years old and 2 or 13.3% were aged> 35 years old.

Table 9

Cross Tabulation of Obesity Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Obesity	Normal	Count	11	4	15
		% Within GDM	73.3%	26.7%	50.0%
	Obesity 1	Count	1	8	9
		% Within GDM	6.7%	53.3%	30.0%
	Obesity 2	Count	3	3	6
		% Within GDM	20.0%	20.0%	20.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 9 note that of the 15 people who did not have gestational diabetes mellitus there are 11 people or 73.3 percent were obese, 1 or 6.7 per cent are obese 1, and 3 people or 20.0 per cent of obese 2. Then of 15 people who experience gestational diabetes mellitus, there are 4 people or 26.7 percent were obese, 8 people, or 53.3 percent are obese 1, and 3 people or 20.0 per cent of obese 2.

To test the logistic regression analysis, we first conduct a chi square test. Based on test results simultaneously obtained chi-square value (16.660) more than the value of chi square table with db=3 (7.815) or the significance value (0.001) is less than alpha (0.050) so that there is significant influence between Never Giving Birth ≥ 4000 g, History Families with diabetes, and obesity on Gestational Diabetes Mellitus simultaneously.

Based on test results using logistic regression as follows:

Table 10

Determination Test Results

Step	-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	24.928a	.426	.568

The coefficient of determination of the influence of ever having a baby macrosomia, family history of diabetes, and gestational diabetes mellitus obesity on the basis of scoring Negelkerke R Square of 0.568. It showed that 56.8 per cent of the incidence of gestational diabetes mellitus had delivered a baby affected by macrosomia, family history of diabetes, and obesity.

Discussion

Based on the results that gave birth to a baby macrosomia history, family history of diabetes mellitus and obesity affect the incidence of gestational diabetes mellitus of 56.8%.

History gave birth macrosomia affects the incidence of diabetes mellitus of 56.8% is supported by the results of the study respondents who have diabetes mellitus are 12 3 (20%) who had delivered a baby macrosomia. Then from 15 people who experience gestational diabetes mellitus, there are 10 people (66.7%) who had delivered a baby macrosomia. The results of the above study was supported by the results of research Susianti, 2017 obtained hasill fisher test p value 0.034 <α 0,05 thus concluded that there is a relationship heredity (grand parents / obesity) and the incidence of macrosomia, and based on interviews researchers found that mothers who give birth big baby recognize weight gain during pregnancy is > 15 kg and there is heredity from parents.

Fetal macrosomia is defined as the weight > 4000 g and occurs in approximately 5% of births. Large for gestational age of the fetus can be related to the maternal diabetes mellitus or a history of severe obesity or obesity gave birth weight infant macrosomia (Ralph C. Benson, 2008). There are several causes of macrosomia babies experience the offspring where a pregnant woman is obese at risk 4-12 times for large baby. Macrosomia babies can be caused by excessive maternal weight before pregnancy (obesity) and BB rise during pregnancy more than 15 kg. In a study published in the journal of obstetrics and gynecology mentioned that research involving pregnant women and their babies in America some 40,000 participant, once analyzed, data showed that one in five women experience excessive weight gain during pregnancy, which made it 5-10 times

higher risk of having a baby macrosomia (Rukiyah AY, 2015). Diabetes mellitus results in mothers who gave birth macrosomia babies. While pregnancy is diabetogenic conditions with increased insulin resistance and decreased peripheral glucose uptake due to placental hormones that have anti-insulin activity. In this way the fetus will have a continuous supply of glucose by facilitated diffusion in the membrane of the placenta, fetal circulation which also occurs abnormal composition of energy sources (Rukiyah AY, 2015). Diabetes mellitus results in large babies mother/macrosomia, while pregnancy is diabetogenic conditions with increased insulin resistance and decreased peripheral glucose uptake due to placental hormones that have anti-insulin activity. In this way the fetus will have a continuous supply of glucose by facilitated diffusion in the membrane of the placenta, fetal circulation which also occurs abnormal composition of energy sources (Rukiyah AY, 2015). Based on the results of research and theories that support the researcher's assumption that the results are in accordance with the theory that the birth of macrosomic babies can be influenced by excessive weight gain before pregnancy or during pregnancy.

A family history of Diabetes Mellitus, DM derived according to Mendell law autosomal recessive with incomplete penetration, if both parents suffer from diabetes, then all children will become diabetic patient. The presence of a family history of diabetes associated with the occurrence of diabetes. The study of genome-wide association found that there is a kind of single nucleotide polimorphisms (SNPs) associated with the function of pancreatic beta cells that produce insulin. Based on CDC, 2011 states that people who have one or more family members both parents, siblings, or children who suffer from diabetes, are at risk of 2-6 times more likely to suffer from diabetes than those who do not have family members who suffer from diabetes. Based on the results of research and theories that support the researcher's assumption that the results of the study are consistent with the theory that a family history of diabetes mellitus can increase the risk of developing diabetes in pregnancy.

Obesity is an abnormal or excessive accumulation of fat in adipose tissue and this is one of the risk factors for DM, according to the results of research from Rosadi, 2013 states that people who are obese based on body mass index are at risk of developing DM by 2.51 greater than people who are not obesity (OR = 2.51) and people with obese waist circumference are 1.79 times greater risk than people who are not obese waist circumference. Obesity is a risk factor that plays an important role in Diabetes Mellitus (Suyono, 2012). Obese condition often appears at the age above 25 years, this is supported by the characteristics of the respondent's data that most respondents in both groups are in the age range of 21-30 years or reproductive age, the number in the risk group (86.6%) and the control group (80 %). Obesity is influenced by eating patterns that are less fiber and physical activity that is less than optimal, unhealthy lifestyles, especially because of the consumption of unbalanced foods (high-fat and high-calorie foods), on the other hand young people tend to adopt a "sedentary lifestyle" (pattern life that does not move a lot or do physical activity), so that body fat increases and will cause the body difficulty using insulin produced, this condition is called insulin resistance. Because of the ineffectiveness of the action of insulin to help absorb glucose by the body's cells, the pancreas will try to produce more insulin. Over time because of being forced to produce excess insulin continuously, finally the ability of the pancreas to produce insulin decreases. This condition is called insulin resistance. Central obesity is caused by a buildup of tissue around the vicera (viceral fat), this can increase levels of plasma TNf (tumor Necroting Factor α) and change TNf α to produce inflammatory cytokines and trigger marker cells through interactions with TNf α receptors that can cause plasma insulin resistance. This condition can further damage the condition of the arteries and liver (www.medlineplus/ metabolicsyndrome.html). Based on the results of research and theory researchers assume that there is an influence between obesity with the onset of gestational diabetes mellitus.

Conclusions and Recommendation

Based on the results of this study concluded that 56.8 per cent of the incidence of gestational diabetes mellitus had delivered a baby affected by macrosomia, family history of diabetes, and obesity.

With the results of the study as described above, then the pregnant women can take preventive measures early through marital consultant, simultaneously antenatal care and early detection of risk factors. While health officials are expected to conduct screening of pregnant women and monitoring of cases of pregnant women at risk.

Hopefully this research can be developed with a cohort approach method and the number of population and a larger sample, so that research results can be generalized.

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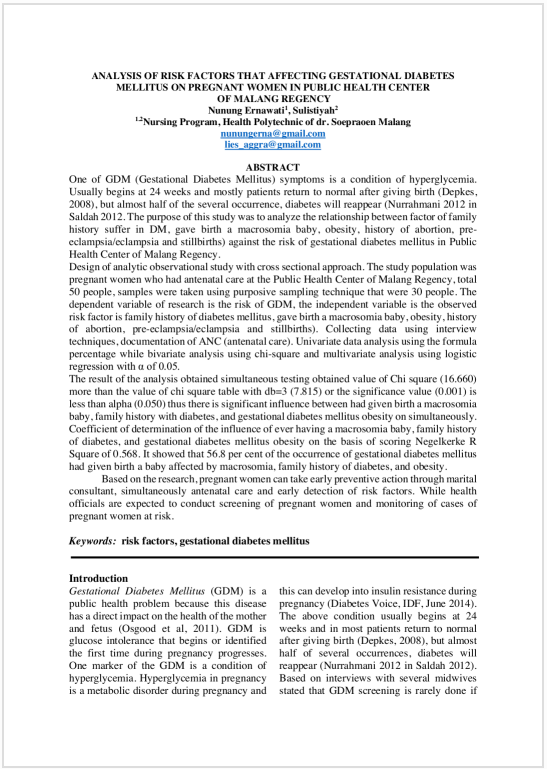

ANALYSIS OF RISK FACTORS THAT AFFECTING GESTATIONAL DIABETES MELLITUS ON PREGNANT WOMEN IN PUBLIC HEALTH CENTER OF MALANG REGENCY

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ABSTRACT

One of GDM (Gestational Diabetes Mellitus) symptoms is a condition of hyperglycemia. Usually begins at 24 weeks and mostly patients return to normal after giving birth (Depkes, 2008), but almost half of the several occurrence, diabetes will reappear (Nurrahmani 2012 in Saldah 2012. The purpose of this study was to analyze the relationship between factor of family history suffer in DM, gave birth a macrosomia baby, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths) against the risk of gestational diabetes mellitus in Public Health Center of Malang Regency.

Design of analytic observational study with cross sectional approach. The study population was pregnant women who had antenatal care at the Public Health Center of Malang Regency, total 50 people, samples were taken using purposive sampling technique that were 30 people. The dependent variable of research is the risk of GDM, the independent variable is the observed risk factor is family history of diabetes mellitus, gave birth a macrosomia baby, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths). Collecting data using interview techniques, documentation of ANC (antenatal care). Univariate data analysis using the formula percentage while bivariate analysis using chi-square and multivariate analysis using logistic regression with α of 0.05.

The result of the analysis obtained simultaneous testing obtained value of Chi square (16.660) more than the value of chi square table with db=3 (7.815) or the significance value (0.001) is less than alpha (0.050) thus there is significant influence between had given birth a macrosomia baby, family history with diabetes, and gestational diabetes mellitus obesity on simultaneously. Coefficient of determination of the influence of ever having a macrosomia baby, family history of diabetes, and gestational diabetes mellitus obesity on the basis of scoring Negelkerke R Square of 0.568. It showed that 56.8 per cent of the occurrence of gestational diabetes mellitus had given birth a baby affected by macrosomia, family history of diabetes, and obesity.

Based on the research, pregnant women can take early preventive action through marital consultant, simultaneously antenatal care and early detection of risk factors. While health officials are expected to conduct screening of pregnant women and monitoring of cases of pregnant women at risk.

Keywords: **risk factors, gestational diabetes mellitus**

Introduction

Gestational Diabetes Mellitus (GDM) is a public health problem because this disease has a direct impact on the health of the mother and fetus (Osgood et al, 2011). GDM is glucose intolerance that begins or identified the first time during pregnancy progresses. One marker of the GDM is a condition of hyperglycemia. Hyperglycemia in pregnancy is a metabolic disorder during pregnancy and this can develop into insulin resistance during pregnancy (Diabetes Voice, IDF, June 2014). The above condition usually begins at 24 weeks and in most patients return to normal after giving birth (Depkes, 2008), but almost half of several occurrences, diabetes will reappear (Nurrahmani 2012 in Saldah 2012). Based on interviews with several midwives stated that GDM screening is rarely done if

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Introduction

Gestational Diabetes Mellitus (GDM) is a public health problem because this disease has a direct impact on the health of the mother and fetus (Osgood et al, 2011). GDM is glucose intolerance that begins or identified the first time during pregnancy progresses. One marker of the GDM is a condition of hyperglycemia. Hyperglycemia in pregnancy is a metabolic disorder during pregnancy and this can develop into insulin resistance during pregnancy (Diabetes Voice, IDF, June 2014). The above condition usually begins at 24 weeks and in most patients return to normal after giving birth (Depkes, 2008), but almost half of several occurrences, diabetes will reappear (Nurrahmani 2012 in Saldah 2012). Based on interviews with several midwives stated that GDM screening is rarely done if

there are no indications or complaints from patients, even though there is a family history of DM.

Pregnancy is a diabetogenic conditions because the placenta secretoring hormones such as progesterone, cortisol, lactogen, placenta, prolactin and growth hormone, which is a major contributor to insulin resistance seen in pregnancy. Insulin resistance usually begins in the second trimester and go forward to the rest of the pregnancy. Pregnant women suffering from DMG can increase morbidity fetus will be born. The complications included fetal macrosomia, congenital abnormalities, hyperbilirubinemia, respiratory distress syndrome and shoulder distocia there by increasing the birth of a baby with sectio caesaria (David R, et al, 2010). Pregnant women with hyperglycemia can make the fetus in the womb experience hyperinsulinemia so that the baby can experience neonatal hypoglycemia a few hours after birth and this will have an impact in the long term the baby has an increased risk of glucose intolerance.

Pregnant women with gestational diabetes mellitus (GDM) almost never feel the complaint, early detection is necessary for pregnant women at risk can be managed as well as possible, so as to improve the welfare of the mother and baby, in addition to the incidence of diabetes mellitus (DM) can be suppressed (Metris, 2013). The risk assessment in pregnant women should be done during the first antenatal care and for pregnant women with consistent characteristics of the risk for GDM should be tested as soon as possible. The purpose of this study was to analyze the relationship between the factor a family history of diabetes mellitus, gave birth to a baby macrosomia, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths) against the risk of gestational diabetes mellitus in Public Health Center of Malang Regency.

Research methods

The study design was observational analytic with cross sectional approach. The population in the study were pregnant women who had antenatal care Clinic of Malang Regency regency, some 50 pregnant women. Samples were taken by purposive sampling technique with a sample size of 30 people. The research variables consist of independent variables, the risk of gestational diabetes, while the dependent variable is a family history of diabetes mellitus, gave birth to a baby macrosomia, obesity, history of abortion, pre-eclampsia/eclampsia and stillbirths). The data collection begins with a consideration of the research ethics board of examiners eligible to consider and implement ethical clearance between researchers with research subjects. Collecting data in this study using interview techniques whereby draft instrument interviews made in the form of questionnaires, documentation ANC (antenatal care). Data were analyzed by univariate, bivariate with chi square and multivariate logistic regression test, using a 95% confidence interval.

Research Result

Based on the results support the general data as follows the majority of respondents in both groups were 21-30 years of age are stretched or reproductive age, the amount of risk groups (86.6%) and control group (80%). The education level of respondents in both groups were high school is at-risk groups (60%) and the control group (53.3%) this gives the meaning that the respondents have secondary education, making them easier to absorb the information. Employment status of respondents in both groups almost the whole is a homemaker tanggga / not working so it's status monthly income respondents also almost a whole is not income. Most of the respondents already have health insurance in the form of BPJS especially at risk group number (60%), while the control group had health insurance only (40%).

Table 1
Frequency Distribution of Gestational Diabetes Mellitus (GDM) Risk Factors on Respondents in Public Health Center

of Malang Regency

No.	Status Obstetrics	Risk Groups (+)		Risk/Control Groups (-)	
		Σ	%	Σ	%
1.	Age Pregnancy (Week)				
	24-28	0	0	3	20
	29-33	8	53.3	4	26.7
	34-38	5	33.3	8	53.3
	> 38	2	13.3	0	0
Total		15	100	15	100
2.	Pregnancy to				
	Primigravidae	0	0	8	53.3
	Multigravidae	15	100	7	46.7
Total		15	100	15	100
3.	Frequency of ANC				
	Regular	15	100	14	93.3
	Irregular	0	0	1	6.7
Total		15	100	15	100

Based on the above table shows that the overall risk groups showed respondents are multigravida and regularly ANC amount (100%) and the majority of 29-33 weeks gestational age (53.3%), whereas the control group showed mostly primigravidae with gestational age 34 -38 weeks (53.3%) and the frequency of regular ANC (93.3%)

Table 2

Cross Tabulation of Variable that Ever Giving Birth a Macrosomia Baby with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Ever Giving Birth Macrosomia Baby	No	Count	12	5	17
		% Within GDM	80.0%	33.3%	56.7%
	Yes	Count	3	10	13
		% Within GDM	20.0%	66.7%	43.3%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0 %	100.0 %

Based on Table 1 note that of the 15 people who did not have gestational diabetes mellitus there are 12 people or 80% were never delivered a baby macrosomia and 3 people or 20% who had delivered a baby macrosomia. Then from 15 people who experience gestational diabetes mellitus there are 5 people or 33.3% who have never given birth ≥ 4000 g and 10 people or 66.7% who had given birth a macrosomia baby.

Table 3

Cross Tabulation of Pre/eclampsia History Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Pre/ eclampsia History	No	Count	14	12	26
		% Within GDM	93.3%	80.0 %	86.7 %
	Yes	Count	1	3	4
		% Within GDM	6.7%	20.0 %	13.3 %
Total		Count	15	15	30
		% Within GDM	100.0 %	100. 0%	100. 0%

Based on Table 2 that of the 15 people who did not have gestational diabetes mellitus there are 14 people or 93.3% do not have a history of pre/eclampsia and 1 or 6.7% have a history of pre/eclampsia. Then from 15 people who experience gestational diabetes mellitus there are 12 people or 80.0% do not have a history of pre/eclampsia and 3 people or 20% had a history of pre/eclampsia.

Table 4

Cross Tabulation of Recurrent Abortion History Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Recurrent Abortion History	No	Count	13	10	23
		% Within GDM	86.7%	66.7 %	76.7%
	Yes	Count	2	5	7
		% Within GDM	13.3%	33.3 %	23.3%
Total		Count	15	15	30
		% Within GDM	100.0 %	100.0 %	100.0 %

Based on the table above it is known that of the 15 people who did not experience Gestational Diabetes Mellitus there were 13 people or 86.7% did not have a history of recurrent abortion and 2 people or 13.3% had a history of recurrent abortion. Then out of 15 people who have Gestational Diabetes

Mellitus there are 10 people or 66.7% do not have a history of recurrent abortion and 5 people or 33.3% have a history of recurrent abortion.

Table 5

Cross Tabulation of IUFD History Variable with Gestational Diabetes Mellitus

			GDM		Total
			morbidly	Yes	
IUFD History	No	Count	14	13	27
		% Within GDM	93.3%	86.7%	90.0%
	Yes	Count	1	2	3
		% Within GDM	6.7%	13.3%	10.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on table 5 note that of the 15 people who did not have gestational diabetes mellitus there are 14 people or 93.3% do not have a history of IUFD and 1 or 6.7% had a history of IUFD. Then from 15 people who experience gestational diabetes mellitus, there were 13 people or 86.7% do not have a history of IUFD and 2 or 13.3% had a history of IUFD.

table 6

Cross tabulation variables with DM Family History with gestational Diabetes mellitus

			GDM		Total
			No	Yes	
Kelg history. by DM	No	Count	11	1	12
		% Within GDM	73.3%	6.7%	40.0%
	Yes	Count	4	14	18
		% Within GDM	26.7%	93.3%	60.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on table 6 note that of the 15 people who did not have gestational diabetes mellitus there are 11 people or 73.3% do not have a family history of diabetes and 4 people, or 26.7% had a family history of diabetes. Then from 15 people who have Gestational Diabetes Mellitus is 1 or 6.7% did not have a family history of diabetes and 14 people or 93.3% had a family history of diabetes.

Table 7

Cross Tabulation of DM Previous History Variables with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
DM Previous History	No	Count	15	12	27
		% Within GDM	100.0%	80.0%	90.0%
	Yes	Count	0	3	3
		% Within GDM	0.0%	20.0%	10.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 7 note that of the 15 people who did not have gestational diabetes mellitus there are 15 people or 100.0 per cent do not have a disease previous DM and 0 persons or 0.0% had preexisting diabetes disease. Then from 15 people who experience gestational diabetes mellitus there are 12 people or 80.0% do not have a disease previous DM and 3 people or 20.0% had preexisting diabetes disease.

Table 8

Cross Tabulation of Age> 35 years old Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Age> 35 years old	No	Count	15	13	28
		% Within GDM	100.0%	86.7%	93.3%
	Yes	Count	0	2	2
		% Within GDM	0.0%	13.3%	6.7%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 8 note that of the 15 people who did not have gestational diabetes mellitus there are 15 people or 100% are not aged> 35 years and 0 or 0.0% of people aged> 35 years. Then from 15 people who experience gestational diabetes mellitus, there were 13 people or 86.7% are not aged> 35 years old and 2 or 13.3% were aged> 35 years old.

Table 9
Cross Tabulation of Obesity Variable with Gestational Diabetes Mellitus

			GDM		Total
			No	Yes	
Obesity	Normal	Count	11	4	15
		% Within GDM	73.3%	26.7%	50.0%
	Obesity 1	Count	1	8	9
		% Within GDM	6.7%	53.3%	30.0%
	Obesity 2	Count	3	3	6
		% Within GDM	20.0%	20.0%	20.0%
Total		Count	15	15	30
		% Within GDM	100.0%	100.0%	100.0%

Based on Table 9 note that of the 15 people who did not have gestational diabetes mellitus there are 11 people or 73.3 percent were obese, 1 or 6.7 per cent are obese 1, and 3 people or 20.0 per cent of obese 2. Then of 15 people who experience gestational diabetes mellitus, there are 4 people or 26.7 percent were obese, 8 people, or 53.3 percent are obese 1, and 3 people or 20.0 per cent of obese 2.

To test the logistic regression analysis, we first conduct a chi square test. Based on test results simultaneously obtained chi-square value (16.660) more than the value of chi square table with db=3 (7.815) or the significance value (0.001) is less than alpha (0.050) so that there is significant influence between Never Giving Birth ≥ 4000 g, History Families with diabetes, and obesity on Gestational Diabetes Mellitus simultaneously.

Based on test results using logistic regression as follows:

Table 10
Determination Test Results

Step	-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	24.928[a]	.426	.568

The coefficient of determination of the influence of ever having a baby macrosomia, family history of diabetes, and gestational diabetes mellitus obesity on the basis of scoring Negelkerke R Square of 0.568. It showed that 56.8 per cent of the incidence of gestational diabetes mellitus had delivered a baby affected by macrosomia, family history of diabetes, and obesity.

Discussion

Based on the results that gave birth to a baby macrosomia history, family history of diabetes mellitus and obesity affect the incidence of gestational diabetes mellitus of 56.8%.

History gave birth macrosomia affects the incidence of diabetes mellitus of 56.8% is supported by the results of the study respondents who have diabetes mellitus are 12 3 (20%) who had delivered a baby macrosomia. Then from 15 people who experience gestational diabetes mellitus, there are 10 people (66.7%) who had delivered a baby macrosomia. The results of the above study was supported by the results of research Susianti, 2017 obtained hasill fisher test p value 0.034 <α 0,05 thus concluded that there is a relationship heredity (grand parents / obesity) and the incidence of macrosomia, and based on interviews researchers found that mothers who give birth big baby recognize weight gain during pregnancy is > 15 kg and there is heredity from parents.

Fetal macrosomia is defined as the weight > 4000 g and occurs in approximately 5% of births. Large for gestational age of the fetus can be related to the maternal diabetes mellitus or a history of severe obesity or obesity gave birth weight infant macrosomia (Ralph C. Benson, 2008). There are several causes of macrosomia babies experience the offspring where a pregnant woman is obese at risk 4-12 times for large baby. Macrosomia babies can be caused by excessive maternal weight before pregnancy (obesity) and BB rise during pregnancy more than 15 kg. In a study published in the journal of obstetrics and gynecology mentioned that research involving pregnant women and their babies in America some 40,000 participant, once analyzed, data showed that one in five women experience excessive weight gain during pregnancy, which made it 5-10 times

higher risk of having a baby macrosomia (Rukiyah AY, 2015). Diabetes mellitus results in mother who gave birth macrosomia babies. While pregnancy is diabetogenic conditions with increased insulin resistance and decreased peripheral glucose uptake due to placental hormones that have anti-insulin activity. In this way the fetus will have a continuous supply of glucose by facilitated diffusion in the membrane of the placenta, fetal circulation which also occurs abnormal composition of energy sources (Rukiyah AY, 2015). Diabetes mellitus results in large babies mother/macrosomia, while pregnancy is diabetogenic conditions with increased insulin resistance and decreased peripheral glucose uptake due to placental hormones that have anti-insulin activity. In this way the fetus will have a continuous supply of glucose by facilitated diffusion in the membrane of the placenta, fetal circulation which also occurs abnormal composition of energy sources (Rukiyah AY, 2015). Based on the results of research and theories that support the researcher's assumption that the results are in accordance with the theory that the birth of macrosomic babies can be influenced by excessive weight gain before pregnancy or during pregnancy.

A family history of Diabetes Mellitus, DM derived according to Mendell law autosomal recessive with incomplete penetration, if both parents suffer from diabetes, then all children will become diabetic patient. The presence of a family history of diabetes associated with the occurrence of diabetes. The study of genome-wide association found that there is a kind of single nucleotide polimorphisms (SNPs) associated with the function of pancreatic beta cells that produce insulin. Based on CDC, 2011 states that people who have one or more family members both parents, siblings, or children who suffer from diabetes, are at risk of 2-6 times more likely to suffer from diabetes than those who do not have family members who suffer from diabetes. Based on the results of research and theories that support the researcher's assumption that the results of the study are consistent with the theory that a family history of diabetes mellitus can increase the risk of developing diabetes in pregnancy.

Obesity is an abnormal or excessive accumulation of fat in adipose tissue and this is one of the risk factors for DM, according to the results of research from Rosadi, 2013 states that people who are obese based on body mass index are at risk of developing DM by 2.51 greater than people who are not obesity (OR = 2.51) and people with obese waist circumference are 1.79 times greater risk than people who are not obese waist circumference. Obesity is a risk factor that plays an important role in Diabetes Mellitus (Suyono, 2012). Obese condition often appears at the age above 25 years, this is supported by the characteristics of the respondent's data that most respondents in both groups are in the age range of 21-30 years or reproductive age, the number in the risk group (86.6%) and the control group (80 %). Obesity is influenced by eating patterns that are less fiber and physical activity that is less than optimal, unhealthy lifestyles, especially because of the consumption of unbalanced foods (high-fat and high-calorie foods), on the other hand young people tend to adopt a "sedentary lifestyle" (pattern life that does not move a lot or do physical activity), so that body fat increases and will cause the body difficulty using insulin produced, this condition is called insulin resistance. Because of the ineffectiveness the action of insulin to help absorb glucose by the body's cells, the pancreas will try to produce more insulin. Over time because of being forced to produce excess insulin continuously, finally the ability of the pancreas to produce insulin decreases. This condition is called insulin resistance. Central obesity is caused by a buildup of tissue around the vicera (viceral fat), this can increase levels of plasma TNf (tumor Necroting Factor α) and change TNf α to produce inflammatory cytokines and trigger marker cells through interactions with TNf α receptors that can cause plasma insulin resistance. This condition can further damage the condition of the arteries and liver (www.medlineplus/ metabolicsyndrome.html). Based on the results of research and theory researchers assume that there is an influence between obesity with the onset of gestational diabetes mellitus.

Conclusions and Recommendation

Based on the results of this study concluded that 56.8 per cent of the incidence of gestational diabetes mellitus had delivered a baby affected by macrosomia, family history of diabetes, and obesity.

With the results of the study as described above, then the pregnant women can take preventive measures early through marital consultant, simultaneously antenatal care and early detection of risk factors. While health officials are expected to conduct screening of pregnant women and monitoring of cases of pregnant women at risk.

Hopefully this research can be developed with a cohort approach method and the number of population and a larger sample, so that research results can be generalized.

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