CORRELATION HISTORY OF DIABETES IN PREGNANT MOTHERS WITH MACROSOMIA EVENTS

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ABSTRACT

Pregnancy is a diabetogenic condition characterized by weight gain and hormonal changes that stimulate insulin resistance in the tissues, which causes the body to not be able to maintain glucose in the normal range. Diabetes women can not overcome the increased need for insulin, causing plasma blood glucose to increase or so-called hyperglycemia. Gestational diabetes mellitus (DMG) is a disorder of carbohydrate tolerance that occurs or is first known when a pregnancy is in progress. This situation is common at 24 weeks of pregnancy and some patients will return to normal after delivery. Macrosomia or large baby is the birth weight of a baby exceeding 4000 grams. Macrosomia is also called giant baby. According to Cumningham all neonates weighing 4000 grams or more regardless of gestational age are considered macrosomia.

The purpose of this study was to determine the relationship of diabetes history in pregnant women with the incidence of macrosomia in the working area of Bogor sareal health center in 2019.

This type of research is an analytic survey with analytic research designs. Data collection methods used are cross sectional approach. The sampling technique in this study is Simple Random sampling. Data were processed using SPSS version 17 with Cramer's V statistical test.

The results obtained by data on the frequency of history of diabetes in pregnant women is the highest, there is a history of diabetes with the number of 46 mothers giving birth or 23.0% and those giving birth to the highest macrosomia babies with 32 babies or 16.0% of all mothers giving birth. Cramer's V results obtained p value 0,000 which is smaller than 0.05. There is a correlation between the history of diabetes in pregnant women with the incidence of macrosomia in the Work Area of Bogor City Health Center in 2019.

Key word : *Diabetes, Pregnant Women, Macrosomia*

INTRODUCTION

Pregnancy is a diabetogenic condition characterized by weight gain and hormonal changes that induce resistance. insulin in the tissues, which causes the body to not retain glucose within normal ranges. Diabetes mom can't cope with the increased need for insulin, causing glucose blood increased plasma or what is called *hyperglycemia*.[1]

Pregnancy or gestation lasts approximately 38-40 weeks from conception. During this time, the fetus has a placenta which functions as the respiratory, digestive and kidney systems during intrauterine life. Besides, the placenta also functions to distribute nutrients from mother to fetus to meet nutritional needs during pregnancy.

Based on data from the World Health Organization (WHO), Indonesia now ranks 4th in the largest number of pregnancies with diabetes world melitus. In 2009, the number of pregnancies with

diabetes in Indonesia it reaches 14 million people. Of this number, only 50% of sufferers are aware of the disease and about 30% of them take regular medication. According to several prevalence epidomological studies diabetes in Indonesia ranges from 1.5 to 2.3, except for Manado which tends to be higher at 6.1%.[2]

Gestational diabetes mellitus (DMG) is a disorder of carbohydrate tolerance that occurs or is known for the first time during pregnancy. This situation usually occurs at 24 weeks of gestation and some patients will return to normal after giving birth.[3] Pregnant women with *hyperglycemia* can be classified as pregnant women with diabetes who have settled before becoming pregnant (*pregestational*) or pregnant women with diabetes that just happened during pregnancy (*diabetes gestational mellitus*).

Called gestational diabetes when the impaired glucose tolerance that occurs during pregnancy returns to normal within 6 weeks of delivery. Diabetes mellitus (not gestation) is considered if impaired glucose tolerance persists after delivery. In this group, the condition of diabetes is experienced temporarily during pregnancy. This means that diabetes or glucose intolerance is first discovered during pregnancy, usually in the second or third trimester.13 Gestational diabetes occurs at weeks 24 to 28 during pregnancy. Although diabetes during pregnancy is one of the risk factors for developing type II diabetes. This condition is a temporary condition in which blood sugar levels will return to normal after childbirth.[3]

Pregnant women who have *gestational diabetes mellitus* have a high risk of *developing gestational diabetes mellitus* again in their next pregnancy, and also 17% - 63% of them will change and develop type 2 diabetes within 5 to 16 years.[3] *Gestational diabetes mellitus* can occur in pregnant women over 30 years of age, obese women (BMI ≥30), women with a history of diabetes mellitus in the parents or a history *of gestational diabetes mellitus* in previous pregnancies and giving birth to babies with birth weight ≥4000 grams and the presence of glucosuria.

Globally, the prevalence of diabetes mellitus in pregnancy is 16.9%. As many as 91.6% of cases of diabetes mellitus in pregnancy occur in countries with moderate and low economies, and limited access to maternal health services.[4]

Southeast Asia has the highest prevalence at 25%. *Gestational Diabetes Mellitus is* estimated to reach 380 million by 2025.[2] In Indonesia, the incidence of *gestational diabetes mellitus* (Diabetes in

pregnancy) is around 1.9-3.6% and about 40-60% of women have *diabetes. mellitus gestational* follow-up postpartum observation will suffer *gestational diabetes mellitus* or impaired glucose tolerance.[3] In West Java the incidence of *gestational diabetes mellitus* (diabetes in pregnancy) in 2013 was recorded at around 418,110 people out of the total population of 32,162,328 women in West Java who had *gestational diabetes mellitus*.[4]

The Pedersen hypothesis states that *hyperglycemia* in the mother cancause *hyperglycemia* alsoin the fetus because glucose can easily penetrate the placenta. This causes an excessive fetal insulin response resulting in excessive fetal growth which leads to large birth weight (*macrosomia*).

Macrosomia or large babies is the birth weight of the baby more than 4000 grams. *Macrosomia* is also called *giant baby*. According to Cumningham, all neonates weighing 4000 grams or more regardless of gestational age are considered *macrosomia*.[5]

Macrosomia is thecomplication *of gestational diabetes mellitus* most common. *Macrosomia was* defined as a baby born weighing ≥ 4000g. Study results at the end of the view of 40patients *diabetic Gestational mellitus* which was monitored for 3.5 years has the most frequent complications is the occurrence of *macrosomia*, this may be due toin general. *diabetes mellitus gestational* diagnosed late especially in our country.[5 The

incidence ofbabies *macrosomic* is about 5% of all births. *Macrosomia* is one of the causes that can complicate the delivery process that can cause birth trauma. Even newborns who are above normal weight cannot cry or breathe spontaneously and regularly at birth. If this condition persists for a long time, it can cause mental or physical disabilities.[6]

The prevalence of *macrosomia* in the world in women *with gestational diabetes mellitus* is 50%. *Gestational diabetes mellitus* which is not managed optimally will cause morbidity in mother and baby. Incidence of *macrosomia* in *gestational diabetes mellitus* with glycemic control bad is 40%.[7]

A major concern with infant delivery *macrosomic* is shoulder dystocia with the associated risk of permanent brachial plexus palsy. Shoulder dystocia occurs when the mother's pelvis is large enough to deliver the fetal head, but not large enough to deliver the shoulders of a fetus that is very large in diameter.[8]

The most common risk factor for babies born with *macrosomia* is diabetes mellitus experienced by the mother or

what is often called *gestational diabetes mellitus*. Diabetes is the most common medical complication of pregnancy. Patients can be separated into those with known pre-pregnancy diabetes (*overt* manifest) and those diagnosed during pregnancy (gestational).[8]

Several studies have shown that the weight of a newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus Gestationality* is a major factor in the birth ofbabies *macrosomic*, other research reports have shown that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history offetal labor *macrosomic*, increased gestational age, and smoking.[8]

Pregnant women with a history of giving birth to *macrosomia have a*5-10 times higher risk of having ababy again *macrosomic* than mothers who have never given birth to ababy *macrosomic.* The results of this study also show that the progeny *macrosomic* with gestational *diabetes mellitus* can be distinguished clearly in utero as characterized by a high growth rate of specialized insulin sensitive tissues including fat, heart, and subcutaneous liver.[8]

Management of pregnant women with *diabetes mellitus Gestational* therapy can be done in two ways, namely by therapy non pharmacological and therapy pharmacology. Non-pharmacological therapy consists of DM / MNT *(Medical Nutrition Therapy)*Diet, Diet / nutritional therapy, SMG (*Self Monitoring of Blood Glucose).* Pharmacological therapy consists of insulin, insulin is a polypeptide hormone consisting of 51 amino acids arranged in 2 chains, the A chain consists of 21 amino acids and the B chain has 30 amino acids.[9]

Based on a preliminary study conducted at 2 BPM (Independent Skill of Midwives), the Tanah Sareal Community Health Center in Bogor City on September 7, 2019 with a *survey* of baby birth data *macrosomic*, that in 2 BPM the work area of the Tanah Sareal Community Health Center, Bogor City in 2018-2019, was recorded the number of mothers giving birth at BPM Bidan Eka Budiarti, S.ST ,. Amd. Keb. In 2019 (January to September) as many as 134 mothers gave birth with babies born *macrosomic* 11with a history of diabetes there were 13 people in the mother. Meanwhile, in BPM Sri Utami, Amd. Keb. In 2018 to 2019, there were 266 mothers who gave birth, with the

number of babies born, *macrosomic* namely 21 babies with a history of diabetes in the mothers, there were 33 people. Total overall history of diabetes in the mother as many as 46 people in both the BPM and as many as 32 women with a history *of diabetes* gave birth to baby *Macrosomia* and the remaining 14 women with a history of diabetes does not give birth to a baby *macrosomia.*the remaining part of the total number of mothers who gave birth in both BPM mothers did not have a history of diabetes and gave birth to babies with normal weight.

Based on the above background, the researchers are interested in conducting research on the relationship of diabetes history in pregnant women with the incidence of *macrosomia* in the work area of the Tanah Sareal Health Center, Bogor City in 2019.

To determine the relationship of diabetes history in pregnant women withincidents *macrosomia* in the Work Area of the Tanah Sareal Health Center, Bogor City, 2019.

RESEARCH METHOD

This research is an *analytic survey that is a survey* or research that tries to explore how and why health phenomena occur. Then perform a dynamic analysis of the correlation between phenomena, both between risk factors and effect factors, between risk factors, and between effect factors regarding how risk factors are studied. The time approach used is *cross sectional*. Research design is a strategy to achieve what has been determined and acts as a guideline or research prosecution in the entire research process.[10]

This research method is carried out with theapproach *Cross Sectional* is a study to study the dynamics of the correlation between risk factors and effect factors, by means of an observational approach, using a checklist filled in by the researcher on the data obtained from the BPM and from related parties, namely mothers who have given birth in both BPM in the Work Area of Puskemas Tanah Sareal Bogor City and data collection at once at one time. The design of this study was to determine the relationship between the history of diabetes in pregnant women and the incidence of *macrosomia* in the Work Area of the Tanah Sareal Health Center in Bogor City in 2019.

This research was conducted in the Work Area of the Tanah Sareal Health Center, Bogor City on September 9, 2019. The population in this study were all mothers. giving birth at 2 BPM in the Work Area of the Tanah Sareal Community Health Center, Bogor City in

2019, totaling 200 mothers giving birth. The sampling method used in this research is *simple random sampling* or random with a lottery system. The sample taken is a population that has met the criteria.

The type of data in this study is in the form of secondary data, namely data collected by related agencies or agencies or not collected by the researcher himself and used by the researcher to complete and carry out research, namely data about the number of all mothers who gave birth in 2018-2019 who were in the Work Area of the Tanah Sareal Health Center, Bogor City.

Data analysis consisted of Univariate and Bivariate analysis. Univariate analysis was performed to obtain data descriptions in the form of frequency distribution and percentage of each independent variable, namely the history of diabetes in pregnant women and the dependent variable, namely the incidence of *macrosomia.* Bivariate analysis is carried out by connecting the independent variable with the dependent variable. The analysis carried out aims to have a statistically significant relationship. In this study, statistical hypothesis testing will be carried out using a test with theformulathe *Cramer's V,correlation* where bivariate analysis analyzesbetween a history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019.

RESEARCH RESULTS

This research was conducted in the working area of the Tanah Sareal Health Center, Bogor City. This research was conducted from 9 September to 13 September 2019 at 2 BPM in the Work Area of the Tanah Sareal Health Center, Bogor City. In this study the researchers looked at the data of all women giving birth based on medical record data to be research material. Collecting data, there were all 400 women giving birth in 2 BPM sareal lands, Bogor city, of the 400 women who gave birth as the research sample, there were 200 women giving birth, the measuring tool used a sheet *checklist*. This research was conducted to determine the Relationship History of Diabetes in Pregnant Bogor City in 2019.

Women with the Incidence of Macrosomia in the Work Area of the Tanah Sareal Health Center inThe results obtained in a study entitled The Relationship of Diabetes History in Pregnant Women with the Incidence of Macrosomia in the Work Area of the Tanah Sareal Health Center, Bogor City, 2019 is as follows:

Table 1
Frequency Distribution of Respondent Characteristics by Age of Pregnant Women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019

No	Age	Frequency	Percentage (%)
1	Age 21-29	52	26.0
2	Age 30-39	148	74.0
Total		200	100

Source : *IBM SPSS Statistics* 17.0

Based on data from Table 1, the frequency distribution of respondent characteristics based on age in pregnant women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019 shows the results of 200 respondents, as many as 148 respondents (74%) aged 30-39 years.

Table 2
Frequency Distribution of Diabetes History in Pregnant Women in the Work Area of the Tanah Sareal Community Health Center, Bogor City in 2019

No	History of *Diabetes Mellitus*	Frequency	Percentage (%)
1	There is a history of DM	46	23.0
2	There is no history of DM	154	77.0
Total		200	100

Source: *IBM SPSS Statistics* 17.0

Based on the data in Table 2, the Distribution of Frequency History of Diabetes in Pregnant Women shows the results of 200 respondents, there are 154 respondents (77%) who have no history of diabetes.

Table 3
Frequency Distribution of Macrosomia Incidents in the Work Area of the Tanah Sareal Health Center in Bogor City in 2019

No	Macrosomia Incidents	Frequency	Percentage (%)
1	Macrosomia	32	16.0
2	Non Macrosomia	168	84.0
	Total	200	100

Source: *IBM SPSS Statistics* 17.0

Based on the data in Table 3, the Frequency Distribution of Macrosomia Events shows the results of 200 respondents, there are 168 respondents (84%) with non-macrosomic baby weight.

Table 4 The
Relationship between Diabetes History in Pregnant Women and Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City, 2019

History of *DM*	Macrosomic events				Total		*P Value*	*OR (Odss Ratio)*
	Macrosomia		Non Macrosomia					
	F	%	F	%	F	%		
Have a history of diabete	32	16	14	7	46	23	0.000	0.304
No history of DM	0	0	154	77	154	77		
Total	32	16	168	84	200	100		

Source: *IBM SPSS Statistics* 17.0

Based on table 4, the Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence of 200 respondents, 154 (77%) pregnant women did not have a history of diabetes and gave birth to non-macrosomic babies.

Thetest results *cramer* show a p value of 0.000 (*p value* <0.05), which means that Ho is rejected and Ha is accepted, so there is a relationship between Diabetes History in Pregnant Women and Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City in 2019. Odds Value The ratio is 0.304, which means that pregnant women with a history of diabetes have the opportunity to give birth to babies with macrosomia by 0.304 times greater than pregnant women who do not have a history of diabetes.

DISCUSSION

1. Univariate Analysis

Discussion is a gap that appears after the researcher conducts research and then compares the results of the study. This research is a research on the Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence in the Work Area of Tanah Sareal Health Center, Bogor City in 2019.

a. Distribution of the frequency of history of diabetes in pregnant women in the Work Area of the Tanah Sareal Community Health Center, Bogor City in 2019

At the beginning of pregnancy, insulin and insulin development factors are the main determinants of fetal growth and fetal organ development. The production of insulin in the fetus, which begins between 8-10 weeks of gestation, is largely determined by the level of glucose in the mother, which is about 80% passed to the fetus through the placental membrane.[11] Mothers with offspring *of gestational diabetes mellitus* who have poor glycemic control are constantly exposed to high levels of glucose and insulin in the uterus, which can accelerate

fetal growth.[11] It is called gestational diabetes when the impaired glucose tolerance that occurs during pregnancy returns to normal within 6 weeks after delivery. Diabetes mellitus (not gestation) is considered if impaired glucose tolerance persists after delivery. In this group, the condition of diabetes is experienced temporarily during pregnancy. This means that diabetes or glucose intolerance is first seen during pregnancy, usually in the second or third trimester.[12] Gestational diabetes occurs at 24 to 28 weeks of pregnancy. Although diabetes during pregnancy is one of the risk factors for developing type II diabetes. This condition is a temporary condition in which blood sugar levels will return to normal after childbirth.[13]

Based on the results of the research, it shows that from the respondents in the work area of the Tanah Sareal Community Health Center, there are 154 respondents (77%) who do not have a history of DM in the work area of the Tanah Sareal Community Health Center, Bogor City.

The results of this study are comparable to research conducted by Heru Setiawan "The relationship between pregnant women with diabetes mellitus and the birth of macrosomia babies at RSAB Harapan Kita Jakarta in 2014" with a total of 30 respondents, 16 (51.7%) respondents did not have a history of DM.

From these data the researchers concluded that if pregnant women, especially those who have a history of diabetes during pregnancy, should reduce foods that are too sweet so that sugar levels are not too high.

b. Macrosmia Incidence in the Work Area of the Bogor City Health Center in 2019

Macrosomia is a baby born weighing> 4000 grams. The growth of fetuses *macrosomic* in the uterus tends to accelerate (after 38 weeks) whereas the growth of non-macrosomic fetuses is more linear during pregnancy. Pregnant women with a history of giving birth to *macrosomia have a* 5-10 times higher risk of having a baby again *macrosomic* than mothers who have never given birth to a baby *macrosomic.*[14]

Several studies have shown that the weight of the newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus gestational* is a factor that is the main cause of the birth of babies *macrosomia*, other research reports suggest that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history offetal labor *macrosomic*, increased gestational age, and smoking.[14]

Based on the results of the study showed that from the respondents in the working area of the Tanah Sareal Health Center, the results obtained from 200 respondents, there were 168 respondents (84%) with non-macrosomic weight babies in the working area of the Tanah Sareal Community Health Center, Bogor City.

The results of this study are comparable to research conducted by Idha Farahdiba "The relationship between a mother with diabetes and the birth of a macrosomic baby at Syekh Yusuf Gowa Hospital in 2018" with a total of 98 respondents, 80 (81.6%) respondents gave birth weighing < 4000. gram (non macrosomia).

From these data it can be concluded that macrosomia is a condition in which a baby is born with a weight> 4000 grams, the birth of a macrosomia baby is due to the mother's poor diet so that it causes diabetes in which mothers with a history of diabetes are very susceptible to birth of macrosomia babies or baby weight> 4000 gram. This requires the mother's knowledge of a good diet to prevent macrosomia by obtaining information from reading media about health, especially health in pregnant women.

2. Bivariate Analysis

a. The Relationship of Diabetes History in Pregnant Women with Macrosomia Incidence in the Work Area of the Bogor City Health Center in 2019

At the beginning of pregnancy, insulin and insulin development factors are the main

determinants of fetal growth and fetal organ development. The production of insulin in the fetus, which begins between 8-10 weeks of gestation, is largely determined by the level of glucose in the mother, which is about 80% passed to the fetus through the placental membrane.[14] Mothers with offspring *of gestational diabetes mellitus* who have poor glycemic control are constantly exposed to high levels of glucose and insulin in the uterus, which can accelerate fetal growth. Research has also shown that the growth of fetuses *macrosomic* in the uterus tends to accelerate (after 38 weeks) whereas non-macrosomic fetus growth is more linear during pregnancy. Pregnant women with a history of delivery have a *macrosomic* 5-10 times higher risk of re-giving birth babies *macrosomic* than mothers who have never given birth to babies *macrosomic.*[14]

Several studies have shown that the weight of the newborn is influenced by various maternal factors, such as fetal constitutional, metabolic and genetic. Despite gestational glucose intolerance and *diabetes mellitus Gestationality* is a major factor in the birth of babies *macrosomic*, other research reports have shown that other maternal factors, such as maternal obesity, affect the weight of the newborn. Other risk factors that cause *macrosomia* include increased blood sugar levels during pregnancy, the sex of a male fetus, a history of fetal labor *macrosomic*, increased gestational age, and smoking.[14]

Based on the cross-table about the results of statistical tests, the relationship between history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019, from 200 respondents, 154 (77%) pregnant women did not have a history of diabetes mellitus and gave birth to non-macrosomic babies . The test *Cramer's V* results obtained *p value* = 0,000, which means *p value* α <(0.05). This means that there is a correlation between the history of diabetes in pregnant women and the incidence of macrosomia in the work area of the Tanah Sareal Community Health Center, Bogor City in 2019.

This research is comparable to the research conducted by Arlia Oroh. "Relationship between Macrosomia and Gestational Diabetes Mellitus at the BLU Observation Section, Prof. DR.RD Kandou Manado in 2015 ", the results of the statistical test *Chi-Square* showed *p value* = 0.000, which means that there is a relationship between *gestational diabetes mellitus* and *macrosomia* in the BLU Obsgin Section of RSUP Prof. DR.RD Kandou Manado in 2015.

From the results of this study there are It can be concluded that the more mothers who have a history of diabetes during pregnancy, the higher the birth of macrosomic babies. Likewise, on the contrary, the more there is no history of diabetes in pregnant women, the lower the birth rate of macrosomic babies.

CONCLUSION

This chapter will present the results of the conclusions and suggestions of "The Relationship of Diabetes History in Pregnant Women in the Work Area of the Bogor City Health Center in 2019".

1. It is known that the distribution of the frequency of diabetes history in pregnant women in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019, of the 200 respondents, there are 154 respondents (77%) who do not have a history of DM.
2. It is known that the distribution of the frequency of macrosomia occurrences in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019, from 200 respondents, there are 168 respondents (84%) with non-macrosomic baby weight.
3. There is a relationship between a history of diabetes in pregnant women and the incidence of macrosomia in the Work Area of the Tanah Sareal Health Center, Bogor City in 2019 with *p value* = 0.000, which means *p value* < α (0.05). The Odds ratio value is 0.304, which means that pregnant women with a history of diabetes have the opportunity to give birth to a baby with macrosomia by 0.304 times greater that of pregnant women who do not have a history of diabetes.

SUGGESTION

1. For STIKes Wijaya Husada

   The results of this study are expected to be used as a reference for the development of science and further research on the relationship between diabetes history in pregnant women and the incidence of macrosomia.

2. For the Tanah Sareal Community Health Center, Bogor City.

   To become a reference for midwives & nurses for early treatment of pregnant women with a history of diabetes, patients should be handled according to the applicable standards and regulations.

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