

## Factors Causing the Risk of Diabetes Mellitus in Pregnant Women at The Semanding Community Health Center

Khusnul Maisaroh<sup>1</sup>, Teresia Retna Puspitadewi<sup>2</sup>, Yasin Wahyurianto<sup>3</sup>, Titik Sumiatin<sup>4</sup>

Program Studi D3 Keperawatan Tuban Poltekkes Kemenkes Surabaya

Email: [khusnulmaisaroh8@gmail.com](mailto:khusnulmaisaroh8@gmail.com)

### Abstrak

Latar belakang: Rasio kematian ibu secara global mengalami penurunan, meskipun begitu hal tersebut belum mencapai angka Tujuan Pembangunan Berkelanjutan (SDG's). Kasus kematian ibu di dunia disebabkan oleh komplikasi selama dan setelah kehamilan dan persalinan, salah satunya diabetes mellitus gestasional. Diabetes mellitus gestasional masih sering terjadi pada ibu hamil karena adanya faktor risiko tertentu yang dapat meningkatkan risiko terjadinya kondisi tersebut. Tujuan : Tujuan penelitian ini untuk mendeskripsikan faktor penyebab risiko diabetes mellitus pada ibu hamil di Puskesmas Semanding Kabupaten Tuban. Metode : Desain penelitian menggunakan deskriptif dengan populasi ibu hamil yang melakukan pemeriksaan periode Januari hingga Maret 2024 sejumlah 60 orang. Teknik *sampling* yang digunakan adalah *simple random sampling*. Instrumen penelitian menggunakan kuesioner faktor penyebab risiko dan kejadian diabetes mellitus gestasional. Hasil : Hasil penelitian menunjukkan hampir seluruhnya ibu hamil berisiko mengalami diabetes mellitus gestasional dengan faktor penyebab risiko yaitu sebagian kecil ibu hamil memiliki riwayat abortus spontan berulang, tidak ada satupun ibu hamil memiliki riwayat melahirkan bayi besar, tidak ada satupun ibu hamil memiliki riwayat melahirkan bayi mati yang tidak diketahui penyebabnya dengan jelas, sebagian kecil ibu hamil memiliki riwayat preeklampsia dan eklampsia, tidak ada satupun ibu hamil memiliki riwayat polihidramnion saat hamil, sebagian kecil ibu hamil berusia di atas 30 tahun, sebagian kecil ibu hamil memiliki riwayat diabetes mellitus ibu hamil atau keluarga, sebagian kecil ibu hamil mengalami kelebihan berat badan, tidak ada satupun ibu hamil memiliki riwayat infeksi saluran kemih berulang selama hamil, sebagian kecil ibu hamil memiliki riwayat hipertensi, dan sebagian kecil ibu hamil memiliki riwayat berat badan lahir ibu di atas 4000-4500 gram. Kesimpulan : Ibu hamil dengan diabetes mellitus hampir tidak pernah mengalami keluhan yang jelas, sehingga penting untuk dilakukan pemeriksaan. Pemeriksaan awal pada ibu hamil bisa meningkatkan kesejahteraan ibu selama dan sesudah kehamilan.

**Kata Kunci : Faktor Risiko, Ibu Hamil, Diabetes Mellitus Gestasional**

### Abstract

*Introduction : The global maternal mortality ratio has decreased, however this has not yet reached the Sustainable Development Goals (SDG's) figures. Cases of maternal death in the world are caused by complications during and after pregnancy and childbirth, one of which is gestational diabetes mellitus. Gestational diabetes mellitus still often occurs in pregnant women because of certain risk factors that can increase the risk of this condition occurring. Purpose : The aim of this study is to describe the risk factors for diabetes mellitus in pregnant women at The Semanding Community Health Center, Tuban Regency. Method : The research design used descriptive research with a population of 60 pregnant women undergoing examinations from January to March 2024. The sampling technique used is simple random sampling. The research instrument used a questionnaire on risk factors and the incidence of gestational diabetes mellitus. Results : The results of the study show that almost all pregnant women are at risk of developing gestational diabetes mellitus with risk factors being that a small number of pregnant women have a history of repeated spontaneous abortions, none of the pregnant women have a history of giving birth to large infants, none of the pregnant women have a history of giving birth to still infants who are not pregnant the cause is clearly known, a small number of pregnant women have a history of pre-eclampsia and eclampsia, none of the pregnant women have a history of polyhydramnios during pregnancy, a small number of pregnant women are over 30 years old, some pregnant women have a history of maternal or family diabetes mellitus, a small number of pregnant women were overweight, none of the pregnant women had a history of recurrent urinary tract infections during pregnancy, a small number of pregnant women had a history of hypertension, and a small number of pregnant women had a history of maternal birth weight above 4000-4500 grams. Discussion : Pregnant women with diabetes mellitus almost never experience clear complaints, so it is important to be examined. Early examination of pregnant women can improve maternal well-being*

*during and after pregnancy.*

**Keywords :** *Risk Factors, Pregnant Women, Gestasional Diabetes Mellitus*

## INTRODUCTION

From 2000 to 2020, there was a 34% decline in the global maternal mortality ratio (MMR), from 342 deaths to 223 deaths per 100.000 live births. Although significant, this figure only reaches one-third of the annual rate of decline of 6,4% needed to achieve the Sustainable Development Goals (SDG's) target of 70 maternal deaths per 100.000 live births by 2030 (UNICEF, 2023).

According to WHO in 2019, the maternal mortality rate throughout the world is still high. As many as 80% of pregnant women's deaths are caused directly by factors such as bleeding (25%), hypertension in pregnant women (12%), obstructed labor (8%), abortion (13%), and other causes (7%). One other cause of death of pregnant women can be related to diabetes mellitus. In 2017, approximately 810 women died every day from complications during and after pregnancy, most of which could have been avoided or treated. It is possible that some complications already existed before pregnancy, but become more severe during pregnancy without proper treatment (WHO, 2019) (Musfirowati, 2021).

According to WHO, around 585.000 mothers die every year due to pregnancy or childbirth, with 28,1% of them caused by diabetes mellitus (Fitriani, 2017). One in ten women has diabetes, the ninth highest cause of death for women globally, and one in seven births is caused by gestational diabetes mellitus (Manuaba, Mokoagow & Mufdillah, 2023).

Gestational Diabetes Mellitus (GDM) is the term for diabetes that occurs during pregnancy. WHO states that GDM is the body's inability to process glucose during pregnancy, both in healthy women and those who have impaired glucose tolerance after pregnancy ends (Nurdiana Djamaluddin S.Kep, Ns, 2020). According to the International Diabetes Federation (IDF) around one in six births (16,8%) involves pregnant women with diabetes, of which 16% of cases may have been affected by diabetes during pregnancy (either pre-existing type 1 or type 2 diabetes that appeared before or during pregnancy ) (Manuaba, Mokoagow & Mufdillah, 2023).

Gestational Diabetes Mellitus (GDM) is a common problem that often occurs during pregnancy. The Association of Diabetes and Pregnancy Study Groups (IADPSG) released data showing that the prevalence of Gestational Diabetes Mellitus (GDM) is estimated to reach 17,8% globally, with Southeast Asia ranking second in terms of the highest cases of Gestational Diabetes Mellitus (GDM) in the world ( McIntyre, et al 2019) (Umiyah, 2023).

According to the International Federation of Gynecology and Obstetrics (FIGO) in 2015, the

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prevalence of Gestational Diabetes Mellitus (GDM) in Indonesia is 1,9% to 3,6% in general pregnancies. The prevalence of pregnant women with a family history of diabetes mellitus is around 1,5%, while those experiencing Gestational Diabetes Mellitus (GDM) from all pregnancies ranges from 1-14% (Manuaba, Mokoagow & Mufdillah, 2023). Based on data from the Semanding Community Health Center, there were 726 pregnant women in 9 villages, but only 60 of them underwent examinations at the Community Health Center from January to March 2024. (LAB.LAP3KIA2024). From the data above, it is possible that some pregnant women may be at risk of suffering from Gestational Diabetes Mellitus (GDM).

Many pregnant women suffer from diabetes mellitus because they are influenced by risk factors that increase the possibility of developing Gestational Diabetes Mellitus (GDM). The factors that cause this risk arise from various aspects, including changeable and unchangeable risk factors (Umiyah, 2023). Some risk factors for Gestational Diabetes Mellitus (GDM) include suspicious obstetric history and suspicious medical history. A suspicious obstetric history includes a history of recurrent spontaneous abortions, a history of giving birth to a stillborn baby of unknown cause, a history of giving birth to a large baby (birth weight above 4000 grams), a history of pre-eclampsia and eclampsia, and polyhydramnios. Meanwhile, suspicious medical history includes the mother's age at the time of pregnancy over 30 years, a history of diabetes mellitus in the pregnant woman or a family history of diabetes mellitus for type 2 diabetes, the mother being overweight or obese, a history of recurrent urinary tract infections during pregnancy, a history of hypertension, and history of maternal birth weight above 4000-4500 grams. (Anik Maryunani, 2021).

Pregnant women who suffer from diabetes mellitus have characteristics such as the age of the pregnant woman over 30 years, gestational age, and being overweight which is related to height and weight. They often never experience complaints, so it is important to have regular checks (Rahmawati et al., 2016). Early examination of pregnant women can improve maternal well-being during and after pregnancy. Pregnant women who have a high risk of experiencing hyperglycemia during pregnancy should undergo routine examinations from the first antenatal visit (Rahmawati et al., 2016). Gestational Diabetes Mellitus (GDM) is a public health issue because it can have a direct impact on the health of the mother and fetus (Manuaba, Mokoagow & Mufdillah, 2023). The impact that may arise due to Gestational Diabetes Mellitus (GDM) is a high risk of experiencing hypoglycemia, hyperglycemia, urinary tract infections, pre-eclampsia, hydramnios and retinopathy. Meanwhile, infants born to mothers with Gestational Diabetes Mellitus (GDM) are at risk of abortion or miscarriage, have a high risk of macrosomia, hypocalcemia, polycythemia and hyperviscosity, and hyperbilirubinemia.

Considering the dangers of pregnancy complications with diabetes mellitus, the government has established policies including the Republic of Indonesia Minister of Health Regulation No. 97 of 2014 concerning Health Services for the Pre-Pregnancy, Pregnancy, Childbirth and Post-Birth Period, Providing Contraception Services, and Sexual Health Services. This regulation explains the handling and follow-up of cases of pregnant women with diabetes mellitus, namely by referring for treatment of diabetes mellitus according to standards, nutritional counseling, appropriate diet planning (Nita & Fitri, 2021). Even though these steps have been taken, the number of diabetes mellitus cases in pregnant women in Indonesia remains high, so other strategies are needed. Therefore, researchers are interested in conducting research on the risk factors that cause diabetes mellitus in pregnant women because understanding these factors can help prevent diabetes mellitus in pregnant women more effectively.

## METHODE

This research uses a descriptive design with a cross-sectional time approach. The population that was the subject of this research were all pregnant women who underwent examinations at the Semanding Community Health Center, Tuban Regency from January to March 2024, totaling 60 pregnant women with a sample size of 52 pregnant women. The sampling technique uses simple random sampling. The variables in this study are factors that cause risk of diabetes mellitus in pregnant women and the incidence of risk of diabetes mellitus in pregnant women. The data collection method uses a questionnaire on risk factors for gestational diabetes mellitus and risk events for gestational diabetes mellitus.

## RESULTS

**Tabel 1. Distribution of risk events for Gestational Diabetes Mellitus (GDM) at the Semanding Community Health Center for the period January to March 2024**

Risk of Gestational Diabetes Mellitus (GDM)	Frequency (n)	Percentage (%)
No Risk of GDM	12	23 %
Risk of GDM	40	77 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 1, it shows that almost all (77%) pregnant women are at risk of developing gestational diabetes mellitus.

**Tabel 2. Distribution of history of recurrent spontaneous abortion among pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Recurrent Spontaneous Abortion	Frequency (n)	Percentage (%)
Yes	13	25 %
No	39	75 %
<b>Total</b>	<b>52</b>	<b>100 %</b>

Based on Tabel 2, it shows that a small percentage (25%) of pregnant women have a history of recurrent spontaneous abortion.

**Tabel 3. Distribution of history of giving birth to large infants among pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Giving Birth to Large Infants	Frequency (n)	Percentage (%)
Yes	0	0 %
No	52	100 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 3, it shows that none (0%) of pregnant women have a history of giving birth to large infants.

**Tabel 4 Distribution of history of giving birth to stillbirths with unclear causes among pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Giving Birth to Stillbirths with Unclear Causes	Frequency (n)	Percentage (%)
Yes	0	0 %
No	52	100 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 4, it shows that not a single (0%) pregnant woman had a history of giving birth to a stillbirth whose cause was unclear.

**Tabel 5. Distribution of history of pre-eclampsia and eclampsia among pregnant women at Semanding health centers for the period January to March 2024**

History of Pre-eclampsia and Eclampsia	Frequency (n)	Percentage (%)
Yes	1	2 %
No	51	98 %
<b>Total</b>	<b>52</b>	<b>100 %</b>

Based on Tabel 5, it shows that a small percentage (2%) of pregnant women have a history of pre-eclampsia and eclampsia.

**Tabel 6. Distribution of polyhydramnios in pregnant women at the Semanding Community Health Center for the period January to March 2024**

Polyhydramnios	Frequency (n)	Percentage (%)
Yes	0	0 %
No	52	100 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 6, it shows that none (0%) of pregnant women had a history of polyhydramnios during pregnancy.

**Tabel 7. Age distribution of pregnant women over 30 years at the Semanding Community Health Center for the period January to March 2024**

The Age of The Pregnant Woman is Over 30 Years	Frequency (n)	Percentage (%)
Yes	8	15 %
No	44	85 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 7, it shows that a small percentage (15%) of pregnant women are over 30 years old.

**Tabel 8. Distribution of maternal or family history of diabetes mellitus among pregnant women at the Semanding Community Health Center for the period January to March 2024**

Maternal or Family History of Diabetes Mellitus	Frequency (n)	Percentage (%)
Yes	13	25 %
No	39	75 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 8, it shows that a small percentage (25%) of pregnant women have a history of maternal or family diabetes mellitus.

**Tabel 9. Distribution of overweight among pregnant women at the Semanding Community Health Center for the period January to March 2024**

Overweight	Frequency (n)	Percentage (%)
Yes	6	12 %
No	46	88 %
<b>Total</b>	<b>52</b>	<b>100 %</b>

Based on Tabel 9, it shows that a small percentage (12%) of pregnant women are overweight.

**Tabel 10. Distribution of history of recurrent urinary tract infections during pregnancy among pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Recurrent Urinary Tract Infections during Pregnancy	Frequency (n)	Percentage (%)
Yes	0	0 %
No	52	100 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 10, it shows that none (0%) of pregnant women had a history of recurrent urinary tract infections during pregnancy.

**Tabel 11. Distribution of history of hypertension in pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Hypertension	Frequency (n)	Percentage (%)
Yes	7	13 %
No	45	87 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 11, it shows that a small percentage (13%) of pregnant women have a history of hypertension.



**Tabel 12. Distribution of birth weight above 4000-4500 grams among pregnant women at the Semanding Community Health Center for the period January to March 2024**

History of Maternal Birth Weight above 4000-4500 grams	Frequency (n)	Percentage (%)
Yes	4	8 %
No	48	92 %
<b>Total</b>	<b>52</b>	<b>100%</b>

Based on Tabel 12, it shows that a small percentage (8%) of pregnant women have a birth weight above 4000-4500 grams.

**Tabel 13. Cross Tabulation of Risk Events for Gestational Diabetes Mellitus (GDM) at the Semanding Community Health Center for the period January to March 2024**

Factors Causing The Risk of Diabetes Mellitus in Pregnant Women		Risk of Gestational Diabetes Mellitus (GDM)				Total	
		Risk of GDM		No Risk of GDM		f	%
		f	%	f	%		
History of Recurrent Spontaneous Abortion	Yes	13	100 %	0	0 %	13	100 %
	No	0	0 %	39	100 %	39	100 %
<b>Total</b>		<b>13</b>	<b>25 %</b>	<b>39</b>	<b>75 %</b>	<b>52</b>	<b>100 %</b>
History of Giving Birth to Large Bbaies	Yes	0	0 %	0	0 %	0	100 %
	No	0	0 %	52	100 %	52	100 %
<b>Total</b>		<b>0</b>	<b>0 %</b>	<b>52</b>	<b>100 %</b>	<b>52</b>	<b>100 %</b>
History of Giving Birth to Stillbirths with Unclear Causes	Yes	0	0 %	0	0 %	0	100 %
	No	0	0 %	52	100 %	52	100 %
<b>Total</b>		<b>0</b>	<b>0 %</b>	<b>52</b>	<b>100 %</b>	<b>52</b>	<b>100 %</b>
History of Pre-eclampsia and Eclampsia	Yes	1	100 %	0	0 %	1	100 %
	No	0	0 %	51	100 %	51	100 %
<b>Total</b>		<b>1</b>	<b>2 %</b>	<b>51</b>	<b>98 %</b>	<b>52</b>	<b>100 %</b>
Polyhydramnios	Yes	0	0 %	0	0 %	0	100 %
	No	0	0 %	52	100 %	52	100 %
<b>Total</b>		<b>0</b>	<b>0 %</b>	<b>52</b>	<b>100 %</b>	<b>52</b>	<b>100 %</b>
The Age of The Pregnant Woman is Over 30 years	Yes	8	100 %	0	0 %	8	100 %
	No	0	0 %	44	100 %	44	100 %
<b>Total</b>		<b>8</b>	<b>15 %</b>	<b>44</b>	<b>85 %</b>	<b>52</b>	<b>100 %</b>
Maternal or Family History of Diabetes Mellitus	Yes	13	100 %	0	0 %	13	100 %
	No	0	0 %	39	100 %	39	100 %
<b>Total</b>		<b>13</b>	<b>25 %</b>	<b>39</b>	<b>75 %</b>	<b>52</b>	<b>100 %</b>
Overweight	Yes	6	100 %	0	0 %	6	100 %
	No	0	0 %	46	100 %	46	100 %
<b>Total</b>		<b>6</b>	<b>12 %</b>	<b>46</b>	<b>88 %</b>	<b>52</b>	<b>100 %</b>
History of Recurrent Urinary Tract Infection during Pregnancy	Yes	0	0 %	0	0 %	0	100 %
	No	0	0 %	52	100 %	52	100 %
<b>Total</b>		<b>0</b>	<b>0 %</b>	<b>52</b>	<b>100 %</b>	<b>52</b>	<b>100 %</b>
Yes		7	100%	0	0 %	7	100 %

History of Hypertension	No	0	0 %	45	100 %	45	100 %
<b>Total</b>		<b>7</b>	<b>13 %</b>	<b>45</b>	<b>87 %</b>	<b>52</b>	<b>100 %</b>
History of maternal Birth Weight above 4000-4500 grams	Yes	4	100 %	0	0 %	4	100 %
	No	0	0 %	48	100 %	48	100 %
<b>Total</b>		<b>4</b>	<b>8 %</b>	<b>48</b>	<b>92 %</b>	<b>52</b>	<b>100 %</b>

Based on Tabel 13, it shows that a small percentage (25%) of pregnant women have a history of repeated spontaneous abortions, none (0%) of pregnant women have a history of giving birth to large infants, none (0%) of pregnant women have a history of giving birth to still infants. the cause is unclear, a small percentage (2%) of pregnant women have a history of pre-eclampsia and eclampsia, none (0%) of pregnant women have a history of polyhydramnios during pregnancy, a small percentage (15%) of pregnant women are over 30 years old, some small (25%) pregnant women have a history of maternal or family diabetes mellitus, a small number (12%) of pregnant women are overweight, none (0%) pregnant women have a history of recurrent urinary tract infections during pregnancy, a small percentage ( 13%) of pregnant women have a history of hypertension, and a small percentage (8%) of pregnant women have a history of maternal birth weight above 4000-4500 grams.

## DISCUSSION

### 1. Risk of Gestational Diabetes Mellitus in Pregnant Women

The research results show that almost all pregnant women are at risk of developing gestational diabetes mellitus.

During pregnancy, changes occur in hormones and metabolism. Metabolic changes involve an increase in blood glucose levels to meet the energy needs of the mother and fetus, on the other hand, changes in hormones include an increase in estrogen and progesterone. An increase in the hormone progesterone causes a decrease in maternal insulin efficiency and changes in insulin response and insulin resistance. This insulin resistance causes an increase in blood glucose levels in pregnant women, which can then lead to gestational diabetes mellitus. This condition can have an impact on the fetus because the mother's blood glucose levels will affect the fetus' blood glucose levels, which in the end will also increase (Rini Fitriani, 2017).

There are several risk factors that can increase the risk of gestational diabetes mellitus, namely suspicious obstetric history factors including a history of repeated spontaneous abortions, a history of giving birth to a stillbirth whose cause is unclear, a history of giving birth to a large baby (birth weight above 4000 grams) and polyhydramnios. And suspicious medical history factors include the pregnant mother's age over 30 years, a history of diabetes mellitus in the pregnant woman or a



family history of diabetes mellitus for type 2 diabetes, the mother being overweight or obese, a history of recurrent urinary tract infections during pregnancy, a history of hypertension, and weight Mother's birth weight is above 4000-4500 grams. (Anik Maryunani, 2021).

Pregnant women are at risk of developing gestational diabetes mellitus due to the increase in hormones that occur during pregnancy, because these hormones are responsible for helping the body absorb and convert blood sugar into energy. If this condition is not treated early, it will have impacts on the mother and fetus, such as hyperglycemia and pre-eclampsia in the mother, and the baby being born is at high risk of developing macrosomia. So it is necessary to carry out screening for pregnant women and nutritional counseling and diet for pregnant women.

## **2. Factors in the History of Repeated Spontaneous Abortions in Pregnant Women**

The research results showed that a small number of pregnant women had a history of recurrent spontaneous abortion. Miscarriage is caused by various multifactorial and polygenic factors that can occur in the development of diabetes. Autoimmune disorders and undetected inflammatory processes clearly play a role in the pathophysiology of miscarriage, and there is evidence to suggest that inflammatory processes also play a role in the development of diabetes. Diabetes mellitus increases the risk of miscarriage associated with lack of glycemic control during the embryonic phase (first 7 weeks of gestation) as indicated by an increase in HbA1c. Pregnant women with diabetes that is not well controlled have a risk of miscarriage between 30% and 60%. The best approach to overcome this problem is to carry out regular control and monitoring (Sulisiyah, et al, 2017).

Pregnant women never check their blood glucose levels in the first trimester. Individuals who suffer from diabetes must adhere to the 5 pillars of managing diabetes mellitus, including maintaining the desired consistency of glycemic control. Especially during pregnancy, monitoring must be carried out more closely to ensure control of blood sugar levels. If the mother does not carry out ANC (Antenatal Care) optimally, this can cause pregnancy complications such as recurrent miscarriage.

## **3. Factors in the History of Giving Birth to Large Infants in Pregnant Women**

The research results showed that none of the pregnant women had a history of giving birth to large infants. An increase in the amount of glucose in the mother results in an increase in the amount of glucose in the fetus. This process stimulates the fetal pancreas to produce more insulin, which causes hyperinsulinemia (Anik Maryunani, 2021). As a result of this situation, a fetus experiencing hyperglycemia and hyperinsulinemia will cause a buildup of fat under the skin and an increase in glycogen, an increase in the size and weight of almost all organs showing cellular

hypertrophy and hyperplasia, as well as the production of red blood cells outside the spinal cord, especially from the liver. causes weight gain. (Sandra Shanty, 2013). Pregnant women with a history of giving birth to macrosomia infants have a 5-10 times higher risk of giving birth to macrosomia infants again (Rini Fitriani, 2017).

Pregnant women always monitor the nutritional intake of the food they digest, so that the fetus's weight can be monitored. Pregnant women who have a history of giving birth to large infants not only have mothers who have experienced excessive weight gain, but also pregnant women with gestational diabetes mellitus who are at risk of giving birth to large infants, because hyperinsulinemia in the fetus increases growth and fat accumulation, this can make the delivery process difficult.

#### **4. Factors in the History of Giving Birth to a Dead Baby Whose Cause is Not Clear in Pregnant Women**

The results of the study showed that none of the pregnant women had a history of giving birth to stillborn infants whose cause was not clearly known.

Indeed, the occurrence of stillbirths without a clear cause is a typical event in pregnancies with overt diabetes. These deaths are considered unexplained due to the absence of factors such as placental problems, fetal growth restriction, or death before delivery, usually at around 35 weeks of gestation or later. However, this death is thought to be caused by the condition of the fetus experiencing hypoglycemia, insufficient placental problems, polycythemia, and high fetal blood viscosity (Anik Maryunani, 2021).

Mothers who have a history of giving birth to stillbirths have clear reasons, including low birth weight, where during pregnancy the mother did heavy activities, the information obtained during the pregnancy check-up was unclear and incomplete, there was a history of multiple pregnancies and poor fetal nutrition. Apart from that, there are other factors, namely asphyxia, the condition of a newborn who does not cry/breathe spontaneously. One of them is caused by the position of the fetus. If it is not treated quickly and appropriately, the baby will die.

#### **5. Pre-Eclampsia and Eclampsia History Factors**

The research results showed that a small number of pregnant women had a history of pre-eclampsia and eclampsia.

Pre-eclampsia during pregnancy can have various causes, including disorders of the vascular system and kidneys. Individuals who experience uncontrolled increases in glucose can cause an increase in blood viscosity which results in decreased blood flow to the kidneys. This feedback process can cause an increase in blood pressure (Sulistiyah, et al, 2017).

Pregnant women with a history of pre-eclampsia and eclampsia have a history of hereditary disease, namely hypertension, which means that when pregnant, the mother's blood pressure cannot be controlled properly, coupled with the results of laboratory tests that the mother's urine contains protein and is at risk of seizures.

## **6. Polyhydramnios Factors in Pregnant Women**

The research results showed that none of the pregnant women experienced polyhydramnios during pregnancy.

All pregnant women with diabetes will experience polyhydramnios during their pregnancy. Polyhydramnios can cause excessive uterine enlargement, increasing the risk of premature membrane rupture (Premature Rupture of Membranes/KPD), premature labor, and postpartum bleeding (Sulistiyah, et al, 2017). Polyhydramnios can occur due to uncontrolled or undiagnosed diabetes, while other cases are related to fetal abnormalities. The presence of macrosomia and polyhydramnios in the fetus may also reflect a lack of adequate glycemic control in the mother (Anik Maryunani, 2021).

Polyhydramnios does not always occur in everyone and the cause of someone experiencing polyhydramnios is not always caused by gestational diabetes mellitus. One of them is caused by multiple pregnancies and fetal abnormalities which make it difficult for the fetus to swallow fluids but the kidneys continue to produce fluids.

## **7. Age Factor of Pregnant Women Over 30 Years**

The research results show that a small percentage of pregnant women are over 30 years old.

Maternal age is one factor that can indirectly play a role in the emergence of pre-diabetes/gestational diabetes mellitus (Sulistiyah, et al, 2017). The risk of gestational diabetes mellitus tends to increase with age, because over the age of 30 years, the body's metabolic function decreases. This decrease is influenced by the reduction in muscle mass that occurs with increasing age (Aspilayuli, et al, 2023).

Pregnant women often do not realize that maternal age over 30 years can increase the risk of gestational diabetes mellitus. Lack of knowledge of pregnant women is caused by a lack of information received. It is best for prospective pregnant women to plan marriage after the age of 20 years and plan a pregnancy between the ages of 20-30 years, because in that age range, organ (physical) maturity has been reached.

## **8. Pregnant Women or Family History of Diabetes Mellitus**

The results of the study showed that a small number of pregnant women had a maternal or family history of diabetes mellitus.

The risk of developing gestational diabetes increases if a person is pre-diabetic. The risk also increases if there is a family history of type II diabetes, such as parents or siblings (Sandra Shanty, 2013). A family history of type II diabetes can increase a person's chances of developing diabetes by 15% and the risk of glucose intolerance, which is a disturbance in normal carbohydrate metabolism, by 30%. Genetic factors can directly affect the beta cells in the pancreas, changing their ability to respond to and secrete insulin. This increases an individual's vulnerability to environmental factors that can affect the integrity and function of pancreatic beta cells (Sulistiyah, et al, 2017).

Pregnant women who have family members with diabetes mellitus are at risk of developing the disease. As is known, diabetes mellitus has a tendency to be inherited or inherited genetically, not transmitted. Genetic factors make it more likely that a person will experience diabetes mellitus.

#### **9. Factors of Being Overweight in Pregnant Women**

The research results show that a small percentage of pregnant women are overweight.

When obesity or overweight occurs, fat cells will produce various substances known as adipocytokines in higher amounts than individuals with normal weight. These substances cause insulin resistance, which makes it difficult for glucose to enter cells. This causes a high increase in glucose levels and results in diabetes. In addition, during pregnancy there is usually an increase in body weight and food intake, which causes blood sugar levels to increase above normal limits. (Aspilayuli, et al, 2023).

Pregnant women experience excess weight due to poor diet, resulting in overweight or obesity and ultimately increasing glucose levels. Obesity before and during pregnancy increases the risk of gestational diabetes mellitus, as excessive body weight can affect sugar metabolism and insulin resistance. Weight gain is important for pregnant women, but it must be avoided excessively.

#### **10. Factors History of Recurrent Urinary Tract Infections During Pregnancy in Pregnant Women**

The results showed that none of the pregnant women had a history of recurrent urinary tract infections during pregnancy. A woman often experiences urinary tract infections and cases increase twice as often during pregnancy. Gestational diabetes mellitus can occur due to damage to pancreatic cells due to infection before or during pregnancy. (Linda & Surtiningsih, 2016). Urinary tract infections can be triggered by high levels of sugar in the sufferer's body, non-optimal white blood cell circulation, and disruption of the bladder emptying process. As a result, urine can stay in the bladder for too long, creating conditions that support the growth of bacteria, including pathogenic bacteria.

Pregnant women do not have a history of recurrent urinary tract infections during pregnancy because the mother's vulvahygiene is appropriate, if it is not appropriate it will cause itching and result in infection, causing insulin resistance and ketoacidosis (excessive blood acid or ketones).

### **11. Factors in the History of Hypertension in Pregnant Women**

The research results showed that a small number of pregnant women had a history of hypertension.

Hypertension in pregnancy is a vascular disorder that can occur before pregnancy, appear during pregnancy, or in the postpartum period. Hypertension that appears after the second trimester is characterized by a mild increase in blood pressure that does not interfere with pregnancy, usually disappears after delivery but can occur again in subsequent pregnancies. In pregnancy with refractory hypertension, the blood vessels lose their response to vasopressor substances, making the blood vessels very sensitive and can trigger pre-eclampsia. Pregnant women with gestational diabetes mellitus are at greater risk of suffering from hypertension in pregnancy and pre-eclampsia. (Ziadatul, et al, 2020). The pathophysiological changes that cause pre-eclampsia can then lead to gestational diabetes. Pre-eclampsia is triggered by damage to the endothelium, and if the damage to the blood vessels does not reverse, this indicates not only pre-eclampsia but gestational diabetes as well. (Marlynda, et al, 2022).

There are hereditary factors in the family and not taking anti-hypertension medication due to being pregnant, so you feel afraid that something will happen to the baby, but this results in someone having a history of hypertension. In pregnant women with hypertension, blood volume will increase progressively during the 6-6th gestational age. 8 weeks and reaches its peak at 32-34 weeks.

### **12. History Factors Mother's Birth Weight above 4000-4500 grams**

The results of the study showed that a small percentage of pregnant women had a history of maternal birth weight above 4000-4500 grams.

Factors that influence the growth and development of macrosomia fetuses include the environmental conditions of the pregnant mother's uterus, placental function, and nutritional intake for the mother and fetus. In the early stages of pregnancy, insulin and insulin growth factors play a crucial role in the growth and development of fetal organs. The formation of insulin in the fetus begins around 8-10 weeks of pregnancy and is greatly influenced by the glucose levels received from the mother through the placenta. Mothers who experience gestational diabetes mellitus that is not well controlled will continuously be exposed to high levels of glucose and insulin in the womb, which can accelerate fetal growth (Rini Fitriani, 2017).

Pregnant women have birth weights above 4000-4500 grams because these pregnant women are born to mothers who are at risk or who suffer from gestational diabetes mellitus. Infants born to mothers with gestational diabetes mellitus have a risk of developing type 2 diabetes mellitus or gestational diabetes mellitus recurring in the future.

## CONCLUSION

1. Almost all pregnant women are at risk of developing gestational diabetes mellitus.
2. A small percentage of pregnant women have a history of recurrent spontaneous abortion.
3. None of the pregnant women had a history of giving birth to large infants.
4. None of the pregnant women had a history of giving birth to a stillbirth whose cause was unclear.
5. A small percentage of pregnant women have a history of pre-eclampsia and eclampsia.
6. None of the pregnant women experienced polyhydramnios during pregnancy.
7. A small percentage of pregnant women are over 30 years old.
8. A small percentage of pregnant women have a maternal or family history of diabetes mellitus.
9. A small percentage of pregnant women are overweight.
10. None of the pregnant women had a history of recurrent urinary tract infections during pregnancy.
11. A small percentage of pregnant women have a history of hypertension.
12. A small percentage of pregnant women have a history of maternal birth weight above 4000-4500 grams.

## RECOMMENDATION

1. The health center carries out health screening on pregnant women in the second trimester to find out whether the pregnant woman is at risk of gestational diabetes mellitus or not, so that it can reduce the incidence of gestational diabetes mellitus in Tuban district.
2. Community health centers should provide advice through posters and education regarding diseases that can occur during pregnancy so that pregnant women can carry out early prevention such as a healthy lifestyle.

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