DESCRIPTION OF HBA1C BLOOD GLUCOSE LEVELS IN THIRD TRIMESTER PREGNANT WOMEN AT THE GENERAL HOSPITAL MITRA MEDIKA BANDAR KLIPPA YEAR 2024

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Abstract

Pregnancy is a condition in which a woman carries and develops a fetus in her womb. This happens when a fertilized egg is attached to the uterine wall by a sperm cell and develops into an embryo. This process usually lasts about nine months, during which the fetus grows and develops into a baby ready to be born. Pregnancy can bring about physical, emotional, and psychological changes in women, and requires special attention to health and nutrition for both mother and fetus. Blood glucose is a carbohydrate in the form of a monosaccharide most commonly found in circulating blood, derived from dietary intake and stored as glycogen in the liver and skeletal muscle. It also refers to the level of glucose present in the blood at any given time. Blood glucose can be generated through the processes of glycogenolysis and glyconeogenesis, where glucose is formed from non-carbohydrate substrates such as fat and protein. HbA1c (Hemoglobin A1c) is a blood test that measures the average amount of blood glucose over a period of about 2-3 months. The type of research used in this study is descriptive research in the form of tables and percentages. This study aims to describe HbA1c blood glucose levels in third trimester pregnant women at RSU Mitra Medika Bandar Klippa. This research was conducted starting from July-August 2024. The samples in this study were third trimester pregnant women as many as 15 samples. The sampling technique used in this study was accidental sampling. The method used in this study, using the Immunofluoresence Analyzer method. From the results of research that has been carried out on 15 samples, it shows that those with normal HbA1c levels are 6 samples (40%) prediabetes HbA1c levels are 5 samples (33.33%) and diabetic HbA1c levels are 4 samples (26.66%).

Keywords: *Third trimester pregnant women, Blood glucose, HbA1c, Immunofluoresence Analyzer*

1. INTRODUCTION

Pregnancy is a condition in which a woman carries and develops a fetus in her womb. This occurs when a fertilized egg attaches to the uterine wall and develops into an embryo. This process typically lasts about nine months, during which the fetus grows and develops into a baby ready to be born. Pregnancy can bring physical, emotional, and psychological changes to women and requires special attention to the health and nutrition of both the mother and the fetus (Purnamayanti & Ayu, 2021). According to data collected by the World Health

Organization (WHO) in 2021, there was an increase of 230 million individuals diagnosed with diabetes, with around 135 million, or about 3-5% of total births, occurring in pregnant women (Gestational Diabetes Mellitus - GDM). The prevalence of diabetes has increased by 16.2% (21.3 million cases) over the last two decades (World Health Organization, 2022).

The prevalence of gestational diabetes mellitus (GDM) in Indonesia is estimated to be between 1.9-3.6%. In 2018, the prevalence of gestational diabetes reached 36% of all pregnancies in Indonesia, with rates up to 5.1% among pregnancies involving women previously diagnosed with diabetes mellitus (Kemenkes RI, 2019). Glucose level testing, particularly HbA1c, is important during pregnancy for early detection of gestational diabetes, management of pre-existing diabetes in pregnant women, glucose control for fetal health, monitoring treatment, and preventing health complications. Overall, monitoring glucose levels, including HbA1c, during pregnancy is a crucial part of comprehensive prenatal care to ensure the health of both mother and fetus (Nugrawati & Amriani, 2021).

Factors that influence elevated HbA1C levels in pregnant women include insulin resistance, gestational diabetes, poor blood glucose control, multiple pregnancies, a history of diabetes, and other risk factors. The most common factor is a family history of diabetes (Lestari et al., 2021). The impact of increased HbA1C on pregnant women affects both maternal and fetal health. One effect for the mother is hyperglycemia (high blood glucose levels), which increases the risk of pregnancy complications such as preeclampsia, urinary tract infections, and the risk of premature birth. Women with gestational diabetes or uncontrolled diabetes prior to pregnancy have a higher risk for complications such as preeclampsia and premature birth (Zhang et al., 2022).

According to a study by Zhang et al. (2022) titled "The Effect of HbA1c and Gestational Weight Gain on Pregnancy Outcomes in Pregnant Women with Gestational Diabetes Mellitus," monitoring and controlling blood glucose levels has proven effective in reducing adverse pregnancy outcomes in women with GDM, particularly those with excessive gestational weight gain. Another study by Fonseca et al. (2021), titled "Third Trimester HbA1c and Its Relationship with Large for Gestational Age Neonates in Women with Gestational Diabetes," stated that several studies in Mediterranean populations have evaluated the role of HbA1c in predicting neonatal complications in women with GDM. A third-trimester HbA1c >5.4% was found to have good sensitivity and specificity in identifying the risk of large-for-gestational-age (LGA) infants.

By choosing pregnant women as research subjects, researchers can gain valuable insights into the measurement of HbA1c glucose levels during pregnancy and their impact on the health of mothers and fetuses, as well as improve care and interventions for the management of gestational diabetes. Based on the background above, the researcher is interested in studying "The Overview of Blood Glucose Levels of HbA1c in Third Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa."

2. METHODOLOGI

The research method used in this study is descriptive research. This study aims to describe the blood glucose levels of HbA1C in third-trimester pregnant women at RSU Mitra Medika Bandar Klippa. The research was conducted at RSU Mitra Medika Bandar Klippa from July to August 2024. The population for this study consists of third-trimester pregnant women who undergo pregnancy check-ups at RSU Mitra Medika Bandar Klippa. The sampling technique used in this study is accidental sampling, with a sample size of 15 third-trimester pregnant women who have their pregnancies checked at RSU Mitra Medika Bandar Klippa.

Data collection methods include primary data, which is obtained through laboratory tests to measure HbA1c blood glucose levels in third-trimester pregnant women, and secondary data, which is gathered from maternal and child health (KIA) records for each pregnant woman obtained from RSU Mitra Medika Bandar Klippa. The examination method used to assess HbA1c levels is the IF Analyzer (Immunofluorescence Analyzer). The principle of the HbA1c examination involves immunofluorescence chromatography for the quantitative detection of HbA1c in human blood using the RaFIA system (Leaflet HbA1c RaFIA Test). The procedure for venous blood collection for HbA1c testing and the HbA1C examination procedure follows the hospital's standard operating procedures (SOP). According to the American Diabetes Association (ADA) in 2018, HbA1c levels are categorized into three groups:

Normal	< 5,7 %
Prediabetes	5,7- 6,4%
Diabetes	>6,4%

Data processing and analysis in this study is conducted descriptively. Descriptive analysis aims to explain and describe the characteristics of each research variable (Sugiyono, 2019). The data from the HbA1c blood glucose level tests in third-trimester pregnant women is processed manually in the form of tables and percentages.

3. RESULTS

3.1 Results

Based on the results of the study conducted on 15 samples for the HbA1c blood glucose level tests in third-trimester pregnant women at RSU Mitra Medika Bandar Klippa, the following HbA1c blood glucose levels were obtained for the third-trimester pregnant women:

***Table 3.1.1**: Results of HbA1c Blood Glucose Level Tests in Third-Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa:*

NO	Sample Code	Ages (Years)	Gestational Ages (Weeks)	Check Up Result (%)	Information
1	S1	31	35 Weeks	5,9%	Prediabetes
2	S2	31	37 Weeks	6,1%	Prediabetes
3	S3	41	33 Weeks	5,9%	Prediabetes
4	S4	33	34 Weeks	6,8%	Diabetes
5	S5	28	34 Weeks	5,1%	Normal
6	S6	32	33 Weeks	7,1%	Diabetes
7	S7	29	35 Weeks	5,3%	Normal
8	S8	30	30 Weeks	5,0%	Normal
9	S9	33	32 Weeks	6,7%	Diabetes
10	S10	40	34 Weeks	6,0%	Prediabetes
11	S11	35	33 Weeks	5,1%	Normal
12	S12	34	36 Weeks	5,3%	Normal
13	S13	28	34 Weeks	7,1%	Diabetes
14	S14	31	29 Weeks	6,2%	Prediabetes
15	S15	32	33 Weeks	5,2%	Normal

Table 3.1.2: *Results of Normal HbA1c Blood Glucose Level Tests in Third-Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa*

NO	Sample Code	Ages (Years)	Gestitation Ages	Chhech Up Results (%)	Information
1	S5	28	34 Weeks	5,1%	Normal
2	S7	29	35 Weeks	5,3%	Normal
3	S8	30	30 Weeks	5,0%	Normal
4	S11	35	33 Weeks	5,1%	Normal
5	S12	34	36 Weeks	5,3%	Normal
6	S15	32	33 Weeks	5,2%	Normal

From the examination of 15 samples, the results of the normal HbA1c blood glucose levels in third-trimester pregnant women were obtained, and the percentage is as follows:

$$= \frac{\text{normal sample}}{\text{Total sample}} \times 100\%$$
$$= \frac{6}{15} \times 100\%$$
$$= 40\%$$

Table 3.1.3: *Results of HbA1c Blood Glucose Level Tests Indicating Prediabetes in Third-Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa*

NO	Sample Code	Ages (Years)	Gestitation Ages	Check Up Results (%)	Information
1	S1	31	35 Weeks	5,9%	Prediabetes
2	S2	31	37 Weeks	6,1%	Prediabetes
3	S3	41	33 Weeks	5,9%	Prediabetes
4	S10	40	34 Weeks	6,0%	Prediabetes
5	S14	31	29 Weeks	6,2%	Prediabetes

From the examination of 15 samples, the results of the HbA1c blood glucose levels indicating prediabetes in third-trimester pregnant women were obtained, and the percentage is as follows:

$$= \frac{\text{Prediabetes Sample}}{\text{Total Sample}} \times 100\%$$
$$= \frac{5}{15} \times 100\%$$
$$= 33.33\%$$

Table 3.1.4: *Results of HbA1c Blood Glucose Level Tests Indicating Diabetes in Third-Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa*

NO	Sample Code	Ages (Years)	Gestitation Ages	Check Up Result (%)	Information
1	S4	33	34 Weeks	6,8%	Diabetes
2	S6	32	33 Weeks	7,1%	Diabetes
3	S9	33	32 Weeks	6,7%	Diabetes
4	S13	28	34 Weeks	7,1%	Diabetes

From the examination of 15 samples, the results of the HbA1c blood glucose levels indicating diabetes in third-trimester pregnant women were obtained, and the percentage is as follows:

$$= \frac{\text{Sample diabetes}}{\text{Total sample}} \times 100\%$$

$$= \frac{4}{15} \times 100\%$$

$$= 26.66\%$$

Table 3.1.5: *Frequency Distribution of HbA1c Blood Glucose Levels: Normal, Prediabetes, and Diabetes in Third-Trimester Pregnant Women at RSU Mitra Medika Bandar Klippa*

Result	Frequency	Percentage
Normal	6	40%
Prediabetes	5	33.33%
Diabetes	4	26.66%
Total	15	100%

Based on Table 4.5, the results of the HbA1c blood glucose level tests in third-trimester pregnant women at RSU Mitra Medika Bandar Klippa show that there are 6 samples (40%) with normal HbA1c levels, 5 samples (33.33%) with prediabetes HbA1c levels, and 4 samples (26.66%) with diabetes HbA1c levels.

4. DISCUSSION

Based on the research conducted, the results of the HbA1c blood glucose level tests in third-trimester pregnant women showed that there were 6 samples with normal glucose levels and 9 samples with elevated levels. The increase in HbA1c levels in third-trimester pregnant women is caused by factors such as increased insulin resistance and hormonal changes. Elevated HbA1c levels in pregnant women can pose risks to the fetus, including fetal macrosomia, premature birth, and preeclampsia in the mother.

Blood glucose is a carbohydrate in the form of monosaccharides that is most commonly found in circulation, derived from food intake and stored as glycogen in the liver and skeletal muscles. It also refers to the level of glucose present in the blood at a given time. Blood glucose can be produced through glycogenolysis and gluconeogenesis, where glucose is formed from non-carbohydrate substrates such as fats and proteins (Nadrati et al., 2021).

Glycogenolysis is the process of forming glucose from non-carbohydrate materials, such as fats and proteins. Glucose is the end product of carbohydrate breakdown during digestion, and the primary function of carbohydrate metabolism is to provide energy for various physiological and metabolic processes. The main source of blood glucose comes from

carbohydrate metabolism, where foods containing carbohydrates are broken down by specific enzymes in the body into monosaccharides (Luthfianto et al., 2019). HbA1c (Hemoglobin A1c) is a blood test that measures the average blood glucose level over the past 2-3 months. Specifically, HbA1c measures how much glucose is bound to hemoglobin in red blood cells. Since red blood cells have a lifespan of about 2-3 months, HbA1c provides an overview of average glucose levels in the blood during that period (Suryati, 2021).

Monitoring glucose levels, especially HbA1c, is crucial during pregnancy for early detection of gestational diabetes, management of pre-existing diabetes in pregnant women, glucose control for fetal health, treatment monitoring, and prevention of health complications. Overall, monitoring glucose levels, including HbA1c, during pregnancy is an essential part of comprehensive prenatal care to ensure the health of both mother and fetus (Nugrawati & Amriani, 2021). According to the American Diabetes Association (ADA) in 2018, HbA1c levels are categorized into three groups: normal <5.7%, prediabetes 5.7–6.4%, and diabetes >6.4%.

The impact of elevated HbA1C on pregnant women affects both maternal and fetal health. One effect for the mother is hyperglycemia (high glucose levels), which increases the risk of pregnancy complications such as preeclampsia, urinary tract infections, and premature birth. Women with gestational diabetes or uncontrolled diabetes prior to pregnancy have a higher risk for complications such as preeclampsia and premature birth (Zhang et al., 2022). Factors influencing the increase in HbA1C in pregnant women include insulin resistance, gestational diabetes, poor blood glucose control, multiple pregnancies, a history of diabetes, and other risk factors. The most common factor is a family history of diabetes (Lestari et al., 2021).

5. CONCLUSIONS

Based on the results of the research conducted by the researcher to determine the "Overview of HbA1c Blood Glucose Levels in Third-Trimester Pregnant Women" using the Immunofluorescence Analyzer method, it was found that there were 6 samples (40%) with normal HbA1c levels, 5 samples (33.33%) indicating prediabetes, and 4 samples (26.66%) indicating diabetes, out of the 15 samples that were tested.

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