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GESTATIONAL DIABETES MELLITUS: A CASE REPORT WITH A CHARACTER FOCUSED ON THE INDIVIDUALIZATION OF THE PATIENT

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Abstract: Introduction: Gestational Diabetes Mellitus (GDM) is considered a group of metabolic disorders, which lead to hyperglycemia, manifested by a set of symptoms. GDM affects the maternal-fetal binomial, reverberating as a major problem in the Unified Health System (SUS), as it is considered a high-risk pathology. Case Presentation: female cisgender patient, 42 years old, fourth pregnancy, with previous systemic arterial hypertension, started prenatal care at 10 weeks of gestational age. Classified in the Body Mass Index (BMI) as overweight. During the prenatal period, her exams presented sufficient alterations for the diagnosis of GDM. From a biopsychosocial context, drug treatment with Metformin was performed. During and after delivery, the mother and baby did not experience any intercurrences. **Conclusions**: in view of the case, the patient underwent prenatal care according to the guidelines, being accompanied by a doctor and a nurse from the family health strategy program, an endocrinologist and a nutritionist. The patient started out overweight and progressed to obesity, as the pregnancy progressed, so non-pharmacological aspects were not enough to prevent GDM. Their biopsychosocial aspects were respected, which enabled the use of the oral hypoglycemic agent, metformin. Therefore, there were no complications during the gestational period, nor during labor and postpartum.
Keywords: Patient Individualization. Women's Health. Pregnant Health. Gestational Diabetes Mellitus.

INTRODUCTION

Gestational Diabetes Mellitus (GDM), according to the Brazilian Society of Diabetes (SBD), is a heterogeneous pathology of a group of metabolic disorders, such as changes in carbohydrate metabolism, which lead to a common factor: hyperglycemia, which usually manifests itself by a set of symptoms, such as weight loss, polyphagia, polydipsia, polyuria. These manifestations affect both maternal and fetal health, mainly affecting the cardiovascular, renal and nervous systems (FERNANDES; BEZERRA., 2020).

According to the SBD, GDM may be present in approximately 1% to 14% of pregnant women, depending on the case studied. The main tests requested by health professionals for the diagnosis of GDM are: fasting blood glucose; glycated hemoglobin (HbA1c). These tests must preferably be requested during the first prenatal consultation, the oral glucose tolerance test, which is the gold standard, can be requested from the twentieth week (ZAJDENVERG et al., 2022). With the diagnosis of GDM, the initiation of non-pharmacological and pharmacological treatment becomes indispensable to avoid possible complications (BEHBOUDI-GANDEVANI et al., 2021).

The first therapeutic approach that must be performed with all pregnant women affected by DM includes individualized nutritional guidance for each patient, in addition to the practice of physical activity according to availability and in the absence of contraindications. If the therapeutic objectives are not met with non-pharmacological measures, pharmacological measures become necessary, and this needs monitoring by a multidisciplinary team (ZAJDENVERG et al., 2022).

NPH insulin is the first choice pharmacological treatment for glycemic control in patients with GDM (SUCHOJ; ALENCAR., 2019). The commonly used therapy is at an initial total dose of 0.5 U/Kg/day, with individualized adjustments according to daily glucose monitoring on a weekly basis (OPAS, 2019).

Another medication that can be considered

an option against GDM is metformin, considered a category B drug by the Federal Agency of the United States Department of Health and Human Services (*Food and Drug Administration*). It is one of the oral antidiabetic drugs (ADO) and can be used as monotherapy in specific cases with impracticable adherence or access to insulin. The dosage of metformin for patients with GDM can vary between 500-2500 mg/day and must be associated with or after meals (OPAS, 2019).

In view of the different approaches taken in the follow-up of GDM, this article aims to analyze the maternal and fetal clinical profile associated with gestational *Diabetes mellitus* through a case report, comparing the treatment performed by the family health strategy physician and by the endocrinologist, together with the nurse and the nutritionist, according to the guidelines of the Brazilian Society of Diabetes (SBD).

CASE PRESENTATION

Patient F. F. L., 42 years old, seamstress, married, lives with husband and youngest child, currently in her fourth pregnancy, confirmed by β-HCG test. She did not use contraception and the pregnancy was unplanned. At the time of consultation, the Date of Last Menstruation (DUM): 10/28/2021 and the Probable Date of Delivery (DPP): 08/04/2022. Gestational Age (GA): 10 weeks and 1 day. Regarding the gestational history, Systemic Arterial Hypertension (SAH) was reported in the third pregnancy, the patient denies smoking, alcoholism or use of other illicit substances, drug allergy and other comorbidities, reports a family history of DM2 and SAH.

Rapid tests were performed for syphilis, HIV and hepatitis B and C, all of which were non-reactive. On physical examination, the patient is 1.55 m tall, weighs 66,400 kg, and has a blood pressure of 100 x 60 mmHg.

At the end of the consultation, prenatal care was opened and the following tests were requested: vaginal bacterioscopy; fasting blood glucose; blood group; Rh factor; blood count; HIV testing; toxoplasmosis IgG and IgM; partial urine; serology for systemic lupus erythematosus; HBsAg; urine culture; cytopathological examination; obstetric ultrasound. In addition to the tests, medications for pain, nausea, vomiting, ferrous sulfate and folic acid were prescribed.

In the second appointment, the patient had 15 weeks of GA and a uterine height (UA) of 14 cm. She returned with the tests previously requested: fasting blood glucose: 81 mg/dl (4.5 mmol/L); other exams did not show abnormalities or reactivity for pathologies. During the consultation, the patient did not present any characteristic complaint.

In the third visit, the patient, on USG, presented 18 weeks and 1 day of GA, UA of 20 cm, Fetal Heart Rate (BCF) 144 bpm. At the time of consultation, the pregnant woman's BMI was 29.90 kg/m², indicating overweight. There were no significant changes in the requested tests and physical examination.

On the fourth consultation, the patient reported edema in the lower limbs bilaterally, not reporting other complaints. She had 22 weeks and 5 days of ultrasound-guided GA, UA 23 cm and BCF 148 bpm. General and dietary guidelines were given and the request for the second trimester exams was initiated, starting from the prenatal period.

On the fifth visit, the patient, on ultrasound, had a GA of 25 weeks and 6 days, UA of 25 cm and BCF of 144 bpm. She had no complaints at the present time. She started methyldopa 250 mg, 3 times a day, due to blood pressure of 140 x 90 mmHg. The result of the oral glucose tolerance test (OGTT) was 228 mg/dl (12.65 mmol/L) after ingestion of 75 g of dextrosol in 1 hour and 197 (10.93 mmol/L) mg/dl after

2 hours; fasting blood glucose of 106 mg/dl (5.88 mmol/L). Other exams did not show any abnormality.

On the sixth consultation, the patient was asymptomatic, had a GA of 28 weeks and 3 days, UA of 25 cm and BCF 144 bpm, the calculated BMI was 32 kg/m². Capillary blood glucose was 153 mg/dl (8.49 mmol/L). A new ultrasound was requested, routine prenatal exams. In addition, there was an increase in the dosage of methyldopa to 500 mg, daily analysis of BP and capillary blood glucose; she was referred to a nutritionist and an endocrinologist for evaluation and management.

On the seventh consultation, the patient was asymptomatic, had a GA of 29 weeks and 3 days and the probable date of delivery was 05/08/2022. Laboratory tests were normal, except for fasting glucose of 110 mg/dl (6.11 mmol/L) and glycated hemoglobin of 6.01%. After consultation with an endocrinologist, treatment was started with metformin 850 mg twice a day, in addition to maintaining the other medications previously used and the corresponding vitamins. On physical examination, she had moderate acanthosis nigricans.

In the eighth consultation, the patient, with a GA of 31 weeks and 3 days, did not have any clinical alteration and her exams were normal, the only alterations being the 6.0% glycated hemoglobin and the fasting glycemia of 110 mg/dl (6.11 mmol/L). Therefore, there was an increase in metformin dosage to 3 times a day.

On the ninth consultation, the patient was at 34 weeks and 2 days of GA, UA of 32 cm and BCF of 146 bpm. She complained of pain and swelling in both lower limbs. She weighed 80 kg, her BMI at the present time was 32.87 kg / m². Random capillary blood glucose was 108 mg/dl (5.99 mmol/L). Rapid tests for syphilis, hepatitis B and C and HIV were requested, all of which were non-reactive.

During the consultations of the 35th, 36th and 37th weeks of GA, in relation to the routine consultations, idealized by the prenatal period, there were no significant clinical changes and no medication was prescribed for the patient studied.

Finally, the patient had a cesarean delivery when she was 37 weeks and 4 days old, male newborn, APGAR both in the first and fifth minutes of 09/10, birth weight of 2990 g, performed the first vaccines and there were no intercurrences during or postpartum.

DISCUSSION

THE RELATIONSHIP BETWEEN OBESITY AND GESTATIONAL DIABETES MELLITUS

The patient in the case started prenatal care at a correct time, meeting the minimum need of 9 consultations during the gestational period, as recommended by the Ministry of Health. During prenatal care, in the first appointment the patient had a BMI of 27.64 kg/m² and when she was 28 weeks and 3 days of gestational age there was an increase in this BMI to 32 kg/m², being referred to the specialist doctor and to the nutritionist. Upon returning for the seventh consultation, the patient had already started treatment with metformin, prescribed by the endocrinologist. The relationship between excessive weight gain and the development of GDM and its consequences for the fetus is known.

Among the main complications provided to the fetus are a higher risk of cesarean section, premature delivery, muster dystocia, neonatal hypoglycemia and fetal macrosomia. Even in childhood, the child may be obese, at greater risk of developing type 2 diabetes mellitus and autism spectrum disorder. For the mother, the main complication is the chronicity of diabetes (SZMUILOWICZ; JOSEFSON; METZGER, 2019; SACKS et al., 2019).

Furthermore, when monitored by

the multidisciplinary team composed of physicians, nurses and a nutritionist, the patient did not present any evolution to serious comorbidities. However, she continued to gain weight, requiring pharmacological intervention, in this case metformin, since the non-pharmacological intervention was not enough to contain the GDM situation.

It is estimated that more than 30% of women of reproductive age are overweight or obese. Recently, the prevalence of women starting the gestational process with a BMI above 30 kg/m² has increased, this adversity has become an imminent problem in world public health, since it generates harmful consequences for the mother-fetus binomial (PARRETTINI ; CAROLI; TORLONE, 2020).

Weight gain is the main factor that determines energy expenditure during the gestational period (KIRWAN et al., 2004). Physiologically, in a pregnancy, in which the woman does not have any comorbidity, insulin-mediated basal glucose levels tend to decrease by 50% based on the body's biological mechanisms. However, the maternal liver enters an advanced state of gluconeogenesis, which causes an increase in maternal blood glucose. From this, women who are overweight, obese or with a previous history of GDM begin pregnancy with their own predisposition to increased insulin resistance (CATALANO, 2014). Therefore, when adding these two factors, both the increase in maternal glucose due to physiological processes and insulin resistance in overweight/obese patients, GDM conditions may have a higher incidence in this specific population.

In correlation with the case, it was noticed that the patient started the gestational period with a BMI of 27.64 kg/m² and ended with a BMI of 32.87 kg/m², that is, going from overweight to obesity. As a consequence of the weight gain and due to the previous history of SAH in the third pregnancy, pharmacological intervention with Methyldopa was necessary. This drug was used from the 25th week onwards, after the laboratory results had ruled out pre-eclampsia, which is characterized by mainly hypertension after the 20th week of pregnancy.

The prevalence of GDM in Brazilian women varies between regions of the country between numbers from 2.4% to 7.2% (ZAJDENVERG et al., 2022). As observed by numerous studies, there are several complications that this pathology can cause to the mother and the baby. In this sense, the importance of rapid detection of pregnancy and early initiation of prenatal care arises. Based on this assessment instrument, the woman is welcomed by the Unified Health System, having her needs covered, through periodic examinations and consultations, with the aim of early diagnosing patients with a predisposition to GDM and, thus, initiating their treatment. This way, complications are avoided, including obesity, which can last until the post-pregnancy period, which causes biopsychosocial harm (CATALANO, 2014).

THE DIAGNOSIS OF GESTATIONAL DIABETES MELLITUS AND THE APPROPRIATE TREATMENT.

The patient in the reported case, during the fifth consultation, when she was 25 weeks and 6 days gestational age, had as a result of the oral glucose tolerance test (OGTT) and fasting glycemia alterations sufficient for the diagnosis from DMG. However, she was not properly diagnosed and, consequently, did not start the recommended treatment.

As a means of diagnosing GDM, the main tests to be performed are fasting blood glucose and glycated hemoglobin, the first being considered normal with values below 92 mg/dL (5.11 mmol/L) and the second with values below of 5.7& (PAHO, 2019).

An observational study conducted in 2008

and the most current and reliable on OGTT, carried out by Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) (MAGANHA et al., 2003), found an ideal mean for maternal hyperglycemia and when and how OGTT could be better used. The TOTG method must be performed from a carbohydrate-free diet during the three days prior to the test, in addition to fasting for 8 hours. This study used by the SBD recommends the diagnosis of GDM between the 24th and 28th week of gestational age when at least 1 of the following glycemia values are reported: fasting OGTT ≥ 92 (5.11 mmol/L) and < 126 mg /dL (6.99 mmol/L); OGTT in 1 hour ≥ 180 (9.99 mmol/L) mg/dl; 2-hour TOTG ≥ 153 (8.49 mmol/L) and < 200 mg/dL (11.1 mmol/L).

In view of the case, the patient was asked to carry out laboratory tests, including the OGTT, she, at that moment, was 22 weeks of gestational age and managed to perform the tests during the time recommended by the guidelines, since she returned with the tests in the following month, when she was 25 weeks of gestational age. The OGTT result was 228 (12.65 mmol/L) mg/dl after ingestion of 75 g of dextrosol in 1 hour and 197 (10.93 mmol/L) mg/dl after 2 hours; fasting blood glucose of 106 mg/dl (5.88 mmol/L), diagnosing the patient with GDM, based on the reference values according to the SBD. Regarding the initial and main therapy, provided by the main guidelines, that is, the non-pharmacological measures, the patient did not correctly follow the dietary and physical activity guidelines. As a result, as the pregnancy progressed, there was weight gain and, consequently, hyperglycemia.

Once diagnosed, the patient must start treatment. Primarily, non-pharmacological treatment based on nutritional control and physical activity is advocated. According to the current literature, more than 40% of patients with GDM have their blood glucose levels controlled only with dietary measures (LOWE et al., 2019). For the American Diabetes Association (ADA), the ideal is to limit the daily intake of carbohydrates to about 40% of the total daily calories consumed. In turn, physical activity has the primary objective of reducing glucose intolerance by stimulating the cardiovascular system, which causes a decrease in insulin resistance. Furthermore, exercise stimulates muscle activity, which is responsible for eliminating up to 75% of basal glucose (ADA, 2002).

PHARMACOLOGICAL INTERVENTION: INSULIN OR METFORMIN?

After multidisciplinary follow-up in which treatment options were discussed, the therapy of choice for the patient in this case was metformin, an oral hypoglycemic agent. The choice for the drug was due to its ease of use, when compared to the use of insulin, due to its application being subcutaneous.

For the Brazilian Society of Diabetes (SBD), insulin is the first choice medication for the pharmacological treatment of GDM because it is safe and effective during pregnancy. In addition, due to the size of the insulin molecule, its passage through the placenta is limited (HOMKO; KHANDELWAL, 1996). An alternative for the treatment of GDM is metformin, as it is easy to use and can be used in situations of technical infeasibility and low infrastructure. One of the adverse effects of metformin is the suppression of mitochondrial respiration. This drug is ideally not used as a first choice, as the preferred treatment is NPH insulin. Metformin can, as a side effect, pass into the fetal blood in its active form and cause hypoglycemia and low fetal development (MENON et al., 1990). In situations where the ultrasound is observed indicating fetal growth restriction or low weight, the drug must not be used and, even more, it needs to be suspended

in pregnant women who use it (BEHBOUDI-GANDEVANI et al., 2021; ZAJDENVERG et al., 2022).

The pharmacological choice needs to be observed from a biopsychosocial point of view, taking into account the patient's wishes and needs, therefore, there are not enough studies that prove the superiority of an insulinization method during pregnancy (BEHBOUDI-GANDEVANI et al., 2021; ZAJDENVERG et al., 2022). As the pregnancy progressed, the patient did not experience any gestational complications, fetal growth occurred as expected and, at birth, her baby had no comorbidities and her weight was within normal parameters. Thus, the results observed in this case showed safety and efficacy in the use of metformin during GDM.

CONCLUSION

This case study reflects on the causes of gestational diabetes mellitus, as well as the diagnostic and therapeutic approach, in addition to its consequences for the maternal-fetal binomial. In this case, as the pregnancy progressed, the patient gained weight, leaving the BMI considered overweight, reaching the obesity indexes. Then, with the passing of the gestational weeks and, through the requested medical tests, mainly the oral glucose tolerance test and fasting blood glucose, GDM was verified, making clear the relationship between weight gain and the pathology in question.

Following the protocols used by the SBD and the Brazilian Federation of Gynecology and Obstetrics Associations (FEBRASGO), the patient was referred to the nutritionist and the endocrinologist, covering the singular therapeutic project (PTS), recommended by the SUS, however the patient did not obtain satisfactory result only with the non-pharmacological methodology, requiring drug intervention.

Even with the knowledge that insulin is the first choice for the treatment of the disease, the aspect of patient individualization was considered, and metformin was chosen, which is the second therapeutic option. In this sense, complete follow-up was carried out during consultations and, as a result, a good prognosis was achieved during pregnancy. The newborn and the patient had no intercurrences during the delivery and postpartum period.

CONFLICT OF INTERESTS

Nothing to declare about it.

REFERENCES

ADA - AMERICAN DIABETES ASSOCIATION. **Standards of medical care for patients with diabetes mellitus**. Diabetes care, v. 25, n. suppl_1, p. s33-s49, 2002.

BEHBOUDI-GANDEVANI, Samira et al. **The effect of mild gestational diabetes mellitus treatment on adverse pregnancy outcomes: a systemic review and meta-analysis.** Frontiers in endocrinology, Lausana, v. 12, p. 271, 2021.

CATALANO, Patrick. M. **Trying to understand gestational diabetes**. Diabetic Medicine, v. 31, n. 3, p. 273-281, 2014.

FERNANDES, Camila Nunes; BEZERRA, Martha Maria Macedo. **O Diabetes Mellitus Gestacional: Causa e Tratamento/The Managemental Diabetes Mellitus: Cause And Treatment**. ID on line Revista de psicologia, [s.l], v. 14, n. 49, p. 127-139, 2020.

HOMKO, Carol J.; KHANDELWAL, Meena. **Glucose monitoring and insulin therapy during pregnancy**. Obstetrics and Gynecology Clinics, v. 23, n. 1, p. 47-74, 1996.

KIRWAN, John P. et al. **Reversal of insulin resistance postpartum is linked to enhanced skeletal muscle insulin signaling**. The Journal of Clinical Endocrinology & Metabolism, v. 89, n. 9, p. 4678-4684, 2004.

LOWE JR, William L. et al. **Hyperglycemia and Adverse Pregnancy Outcome Follow-up Study (HAPO FUS): Maternal Gestational Diabetes Mellitus and Childhood Glucose Metabolism**. Diabetes care, [s.l], v. 42, n. 3, p. 372-380, 2019.

MAGANHA, Carlos Alberto et al. **Tratamento do diabetes melito gestacional**. Revista da associação médica brasileira, v. 49, p. 330-334, 2003.

MENON, Ram K. et al. **Transplacental passage of insulin in pregnant women with insulin-dependent diabetes mellitus: its role in fetal macrosomia**. New England Journal of Medicine, v. 323, n. 5, p. 309-315, 1990.

OPAS - ORGANIZAÇÃO PAN-AMERICANA DA SAÚDE. Ministério da Saúde. Federação Brasileira das Associações de Ginecologia e Obstetrícia. Sociedade Brasileira de Diabetes. **Tratamento do diabetes mellitus gestacional no Brasil**. Brasília, DF, n.1, 2019.

PARRETTINI, Sara; CAROLI, Antonella; TORLONE, Elisabetta. **Nutrition and metabolic adaptations in physiological and complicated pregnancy: focus on obesity and gestational diabetes**. Frontiers in Endocrinology, v. 11, p. 611929, 2020.

SACKS, Kira Nahum et al. **Long-term neuropsychiatric morbidity in children exposed prenatally to preeclampsia**. Early human development, v. 130, p. 96-100, 2019.

SUCHOJ, Maysa; ALENCAR, Aline Paixão. **Insulina degludeca em pacientes portadores de diabetes mellitus tipo 1**. Revista Saúde-UNG-Ser, Guarulhos, v. 12, n. 1/2, p. 47-53, 2019.

SZMUILOWICZ, Emily D.; JOSEFSON, Jami L.; METZGER, Boyd E. **Gestational diabetes mellitus**. Endocrinology and Metabolism Clinics, v. 48, n. 3, p. 479-493, 2019.

ZAJDENVERG, Lenita et al. **Tratamento farmacológico do diabetes na gestação. Diretriz da Sociedade Brasileira de Diabetes**, São Paulo, p. 1-33, jan. 2022.