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Multidisciplinary Care of Pregnant Women with Gestational Diabetes Mellitus: Non-Pharmacological Strategies to Improve Maternal and Perinatal Outcomes

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1. Introduction

Diabetes Mellitus (DM) is an endocrine disorder characterized by hyperglycemia due to insulin deficiency. This deficiency can be caused by reduced pancreatic production, inadequate release in response to increased carbohydrates or peripheral insulin resistance (ADA, 2009).

2. Classification

The first classification for Diabetes Mellitus has been published in 1949 by White Priscilla, categorizing this pathology in classes A, B, C, D, E, F, R, H and T, according to the severity of the disease, age of onset, duration, need for insulin use and the presence or absence of vascular disease arising from the Diabetes Mellitus. This classification is still widely used for predicting complications during pregnancy and is considered as an etiologic and prognostic system (Calderon et al., 2007).

The National Diabetes Data Group (1979) suggested a clinical classification based on the type of Diabetes Mellitus, considering three groups: insulin-dependent Diabetes Mellitus or Type I, Non-insulin-dependent Diabetes mellitus or Type II, and Gestational Diabetes Mellitus (GDM), which is diagnosed during pregnancy. This classification was recommended in 1980 by the World Health Organization Expert Committee on Diabetes Mellitus, being included in the same group of glucose intolerance. This classification was intended to establish a uniform structure for clinical and epidemiological research (Bennett, 1985).

The American Diabetes Association (ADA) restructured the classification and diagnostic criteria for Diabetes mellitus in 1999, emphasizing its etiology. Subsequently, the ADA (2005) ratified this classification recognized two intermediate stages of the disease, being called pre-diabetes, characterized by impaired glucose tolerance and fasting glucose intolerance (Table 1).

I. Diabetes mellitus type 1: beta-cell destruction, usually leading to absolute insulin deficiency
II. Type 2 diabetes mellitus: can vary from primarily due to insulin resistance with relative insulin deficiency to a predominantly secretory defect with insulin resistance
III. Other specific types
Genetic defects of beta cell function
Genetic defects in insulin action
Diseases of the exocrine pancreas
Endocrinopathies
Drug or chemical induced
Infection
Unusual forms of Diabetes immunomediated
Other genetic syndromes sometimes associated with diabetes
IV. Gestational diabetes mellitus

Table 1. Etiological classification of Diabetes mellitus (adapted from ADA, 2005; ADA, 2009).

3. Epidemiological data on pregnancy

The dysglycemia is the most common metabolic disorder in pregnancy, but its frequency varies worldwide and among racial and ethnic groups. Broadly in general, the prevalence of dysglycemia during pregnancy can be up to 13%, corresponding to 0.1% of type 1 diabetes (T1DM), 2-3% of type 2 diabetes (T2DM) and 12 to 13% Gestational Diabetes Mellitus, depending on the diagnostic criteria used and the population studied (Hod; Diamant, 1991).

GDM is defined as glucose intolerance of variable severity, which appears or is first diagnosed during pregnancy (ADA, 2009), disappears after childbirth and that does not correspond to a pre-gestational diabetes (ADA, 2011). There has been a significant increase in the number of diagnoses of GDM over time, possibly related to an increase in average maternal weight and age (Getahun et al, 2008). Prevalence also varies according to the method of testing and diagnostic criteria.

It is recommended the early screening of high-risk pregnant women in the first prenatal visit, which allows identifying preexisting diabetes mellitus cases, which should not be erroneously termed as gestational diabetes. Excluding preexisting diabetes mellitus, pregnancy calls for

the testing of employing glucose overload, from the second trimester of gestation for the diagnosis of GDM. Currently, the American Diabetes Association (ADA, 2011) and the International Association of Diabetes and Pregnancy Study Groups (IADPSG, 2010) recommend 75-g oral glucose tolerance test, with a duration of 2 hours, adopting as diagnostic criteria for GDM cutoff points suggested by the Hyperglycemia and Adverse Pregnancy Outcomes-HAPO study (2008), with plasma levels of fasting glucose greater than or equal 92 mg / dl one hour post glucose load, greater than or equal 180 mg / dl two hours post glucose load, greater than or equal 153 mg / dl, requiring only a single point change for the diagnosis of GDM. Using the diagnostic criteria proposed by IADPSG, there is detection rate of diabetes during pregnancy in about 18% of pregnant women.

4. Glycemic control

The assessment of glycemic control, through laboratory evaluation of fasting and postprandial blood glucose, supplemented with daily home blood glucose self-monitoring, should be considered every one to two weeks by the treating physician or a member of the multidisciplinary team.

Glycemic control is considered appropriate if blood glucose levels remain within the reference values (fasting less than 95 mg / dl, before meals less than 100 mg / dl, one hour postprandial less than 140 mg / dl, two hours postprandial less than 120 mg / dl) and glycosylated hemoglobin test is less than or equal to 6%. The permanence of the blood glucose above the reference values indicates the need for adjustment or inclusion of pharmacological and non-pharmacological therapies (ADA, 2011).

The criterion of excessive fetal growth, through the measurement of fetal abdominal circumference greater than or equal to the 70th percentile on ultrasound between the 29th and 33rd week, can also be used to indicate drug therapy in GDM (Buchanan et al, 1994).

5. Multidisciplinary care for pregnant women with diabetes mellitus

During prenatal care, it is essential to focus on providing information to patients about the pathophysiology and prognosis of diabetes mellitus, either pre-existing or gestational. Therefore, consultation should include targeted guidelines for diabetes care, in addition to whole routine prenatal. Its periodicity depends directly on glycemic control, beyond existence and progression of maternal and fetal complications, detected by clinical examination and complementary propaedeutic, whose discussion is not the focus of this chapter.

Poorly controlled DM is often associated with increased risks of adverse maternal and perinatal outcomes. Education and care programs in diabetes, provided by multidisciplinary team in support of the medical staff, acting either alone or associated with pharmacological treatment, may determine changes in the natural history of the disease, improving maternal and perinatal outcomes.

6. Nutritionist: Adequacy of food habit to nutritional need

Initial treatment of GDM and important part of preexisting diabetes treatment consist of nutritional guidance to provide appropriate levels of caloric intake for adequate weight gain during pregnancy, normalization of glycemia, absence of ketones and promote fetal well-being.

Dietary recommendations follow similar patterns to those aimed at the general population. The nutritional prescription constitutes the calculation of caloric intake and mounting the daily menu, in addition to providing basic concepts about nutrition, healthy eating, the food pyramid and food fractionation to the patient in order to arouse attention to the importance of nutrition in pregnancy.

The ideal weight should preferably be achieved prior to pregnancy, since that is the determining factor of the optimum setting of the nutrition prescription throughout gestation cycle. The calculation of caloric value diet and adequate weight gain can be made according to the idealized tables for this purpose (table 2), based on the Body Mass Index prior to pregnancy, frequency and intensity of physical exercises and fetal growth pattern (Kaiser, Allen, 2008).

Nutritional status	BMI prior to pregnancy (Kg/m²)	Total weight gain in the first trimester (Kg)	Weekly weight gain in the second and third trimesters (Kg)	Total weight gain in the pregnancy (Kg)
Underweight	< 18.5	2.3	0.5	12.5 - 18
Normal Weight	18.5 – 24.9	1.6	0.4	11.5 - 16
Overweight	25.0 – 29.9	0.9	0.3	7 – 11.5
Obese	≥ 30.0	-	0.3	5 - 9

Kg: kilogram
Kg/m²: kilograms per square meter
BMI: Body Mass Index

Table 2. Recommendation for total gain weight during pregnancy according to the Body Mass Index (BMI) before pregnancy (adapted from Kuehn, 2009).

In clinical practice, for women with BMI below 18.5 kg/m², the prescription of caloric intake can be up to 40 kcal / kg / day; for women with BMI between 18.5 and 24.9 kg / m², energy

intake should be 30 kcal / kg / day; for women who are overweight, the caloric supply is 22 to 25 kcal / kg / day; for the morbid obese women the caloric prescription must be from 12 to 14 kcal / kg / day.

The diet should be planned throughout the day, being split into three large meals and three snacks (ADA, 2004), being the carbohydrate intake distributed between them, aiming to prevent postprandial hyperglycemia. The nutritional requirement of carbohydrates should be restricted to less than 40% of total daily calories, with the remainder distributed among proteins (15% to 20% of total calories per day, at least 1.1 g / kg / day) and fats (30% to 40% of total calories per day). The adjustment of the postprandial insulin dose can be done by calculating the carbohydrate content of each meal.

Non-nutritive artificial sweeteners such as aspartame, saccharin, acesulfame-K and sucralose can be used sparingly, aiding the adaptation of taste to food (ADA, 2004).

7. Physical educator and therapist: Physical activity as a strategy for prevention and adjuvant treatment

Physical activity reduces insulin resistance, facilitating peripheral glucose utilization with consequent improvement of glycemic control while also helping to control weight gain during pregnancy (Reader, 2007).

The recommended exercise prescription is low-impact physical activity, ideally being practiced daily for at least 30 minutes, which can be divided into three sessions of ten minutes each, keeping levels not exceeding 50% of the aerobic capacity of the patient (table 3).

Parameter	Programa
Frequency	3 to 4 days / week
Intensity	Variable (according to the previous fitness)
Duration	Initially 15 minutes with gradual increase up to a maximum of 30 minutes / session
Modality	Low impact aerobic Strength training and endurance

Table 3. Prescription of exercise during pregnancy (adapted from Davies et al, 2003).

It constitutes safe method to be used during pregnancy (Szymanski, Satin, 2012). Some precautions should be observed in handling (Ferraro, Gaudet, Adamo, 2012), such as starting the physical activity sessions preferably after meals, avoiding beginning if the blood glucose is below 60 mg / dL or above 250 mg / dL (Artal, 2003). The practice of physical exercises during pregnancy is also contraindicated in cases of obstetric complications and / or concomitant medical complications, as reported in Table 4.

Obstetric contraindications	Clinical contraindications
Previous Miscarriage or preterm childbirth	Cardiovascular disease
Cervical incompetence	Hypertensive disease
Premature rupture of membranes	Respiratory disease
Preterm labor	Anemia (Hb <10 g/dl)
Intrauterine growth restriction	Malnutrition or eating disorder
Multiple pregnancy: (two fetuses after 28 th week or three or more fetuses at any gestational age)	Uncontrolled Diabetes Mellitus Type 1
Placenta previa after 28 th week	Decompensated thyroid disease
Persistent bleeding in the second and / or third trimesters	

Hb: hemoglobin
g/dl: grams per deciliter

Table 4. Contraindications to physical exercise during pregnancy (adapted from Davies et al, 2003).

8. Psychologist: Emotional support as a strategy for treatment adherence

Pregnancy, by itself, constitutes a period marked by several changes in women's lives, involving social, biological, marital and psychological changes, which are aggravated because of the occurrence of clinical and / or obstetric conditions that may potentially alter the maternal and / or fetal outcomes. These changes may act as stressors and may interfere in a positively or negatively way in adherence to the proposed treatment.

Psychological care has an evaluative component and, on the other hand, it also has an instructional feature that serves as a basis for reflection and construction of behavior in the situation experienced.

The initial characterization of the social, emotional and psychological aspects involving a pregnant woman can be accomplished through evaluation instruments (Cohen, Kamarck, Mermelstein, 1983; Zigmond, Snaith, 1983; Sherbourne, Stewart, 1991; Herrmann, 1997).

Regarding psychological intervention approach should initially focus on the demands related to pregnancy and Diabetes Mellitus brought by the patient herself and, subsequently, expand the focus to the instructional aspect, based on the information acquired. The understanding of the whole process of health care and the benefits of the proposed interventions are the basis

for building the strategy of treatment adherence, particularly with regard to diet (Gardner et al, 2012).

9. Nurse: Combination of communication strategies and training techniques

Nursing staff has fundamental integrator role in the care program for pregnant women with diabetes mellitus. It features functions such as consolidation of primary communication channel created by other professionals, technical training of specialized care and monitoring of metabolic control of patient.

Different communication strategies can be adopted in order to achieve success in providing guidance and establishing appropriate relationship with patients, that allow effective training techniques of glycemic control monitoring. The establishment of this open channel of communication between the patient and nursing staff provides another opportunity to solidify concepts, in addition to allowing the sharing of anxieties and doubts, minimized by this team of professionals, collaborating to treatment adherence (Furskog et al, 2012; Mendelson et al, 2008; Persson et al, 2011).

Active and constant participation of nursing staff in the monitoring of glycemic control can determine the establishment of the patient's attention to self-care and, consequently, the drop in rates of adverse events, improving maternal-fetal prognosis (Ferrara et al, 2012)

10. Social worker: Creation of favorable environmental conditions for the treatment

The Social Services is responsible for providing guidance on social rights and social security, as well as duties related to treatment. Actions related to insertion of pregnant women in social support networks can facilitate access to certain resources, which allows better adherence to treatment and success of such proposals.

The social worker must also foster opportunities for discussion in order to create conditions for pregnant women develop their critical capacity as subjects of rights.

Reviews regarding the effectiveness of interventions offered to women during pregnancy who have been identified with social risk factors in relation to the development of depression and adherence to clinical follow-up are under development in literature (Kenyon et al, 2012).

11. Multidisciplinary group: Strategy of sharing experiences

Considering that the behavior of a pregnant woman can act as a multiplier of information and influence the conduct of another patient, it is possible to use pregnant women with adequate

adhesion to treatment as a reference to be followed. In this context, multidisciplinary care with groups of diabetic pregnant women can be an effective complementary strategy to individual assistance.

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