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Metabolic control with diet vs insulin in patients with gestational diabetes and obesity

Control metabólico con dieta vs insulina en pacientes con diabetes gestacional y obesidad

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Abstract

Objective: To identify the degree of metabolic control achieved in pregnant patients diagnosed with Gestational Diabetes and Obesity treated with diet, compared to those treated with insulin. Methodology: Observational, retrospective, longitudinal and descriptive study, carried out from January to December 2021. Metabolic control was evaluated monthly during pregnancy based on the treatment received (diet vs insulin with 23 patients in each group). Results: Of the 23 patients who started on the diet, only 30.4% finished in a controlled manner under the same diet-only regimen. In contrast, of the 23 who started with insulin, 86.9% ended up controlled.

Metabolic Control, Gestational Diabetes, Obesity

Resumen

Objetivo: Identificar el grado de control metabólico logrado en las pacientes embarazadas con diagnóstico de Diabetes Gestacional y Obesidad tratadas con dieta, comparadas con aquellas tratadas con insulina. Metodología: Estudio observacional, retrospectivo, longitudinal y descriptivo, realizado de enero-diciembre de 2021. Evaluándose mensualmente el control metabólico durante la gestación con base en el tratamiento recibido (dieta vs insulina con 25 pacientes en cada grupo). Resultados: De las 25 pacientes que iniciaron con dieta, sólo el 30.4% terminaron en forma controlada bajo el mismo régimen de solo-dieta. En cambio, de las 25 que iniciaron con insulina, el 86.9% terminaron controladas.

Control Metabólico, Diabetes Gestacional, Obesidad

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Introduction

Gestational diabetes is defined as carbohydrate intolerance of variable severity, which is first recognised during pregnancy, and which may or may not resolve after pregnancy, whatever the necessary treatment and postpartum course. Pre-gestational diabetes is established in patients already known to have type 1 or 2 diabetes who become pregnant [1].

The products of mothers with poorly controlled gestational diabetes have an increased risk of macrosomia leading to an increased risk of dystocia and caesarean section to prevent it, and these products require special care and even hospitalisation in neonatal therapy areas. Therefore, metabolic control of gestational diabetes is essential to prevent complications and reduce maternal and foetal morbidity and mortality and thus the number of days of hospitalisation and costs. Obesity itself is a factor of metabolic dyscontrol, so it is important to determine which type of treatment has a favourable impact on metabolic control and obstetric outcome: diet or insulin.

Physiological changes in pregnancy

During pregnancy, the pancreas is subject to a greater demand for adaptation, so there may be varying degrees of alterations in carbohydrate metabolism; these would be genetically determined and may manifest for the first time during pregnancy (GD) or be aggravated in patients with pre-existing diabetes. It must be considered that these metabolic alterations will be accentuated in a state of insulin resistance, such as pre-pregnancy obesity, due to increased abdominal fat or uncontrolled excessive weight gain during the course of pregnancy [2]. Decreased insulin sensitivity in women during pregnancy and inadequate response to insulin secretion are the pathophysiological mechanisms that cause gestational diabetes, with abnormalities in glucose transport by insulin-sensitive tissues and in the affected sensitivity of the b-cells of the pancreas, which synthesise the hormone. Insulin-regulated carbohydrate, protein and lipid metabolism is also affected. Decreased maternal sensitivity to insulin increases the availability of nutrients to the fetus, which increases the risk of excessive growth and increased adiposity.

Diagnosis of gestational diabetes

There are four ways to diagnose Gestational Diabetes according to the Clinical Practice Guideline [1]:

1. Fasting glucose greater than or equal to 126 mg/dl on two occasions 2.
2. Casual blood glucose of +200 mg/dl
3. Screening test with 50 g of glucose with a result greater than or equal to 180 mg/dl (170 mg/dl in women over 30 years of age).
4. Oral Glucose Tolerance Curve with 75 g with two abnormal results, +95 in fasting, +180 in the 1st hour, +155 in the 2nd hour.

Medical treatment

When diet and exercise do not achieve target numbers with fasting glycaemia less than 95 mg/dL and 120 mg/dL two hours postprandial within 2 weeks, pharmacological management should be initiated. Metformin is recommended in patients with gestational diabetes and pregnancy greater than 20 weeks when the patient refuses insulin therapy and does not have metabolic dyscontrol that puts the pregnancy at risk.1 Approximately 25% of patients with GD require medical management with insulin. Some are treated with a single dose of neutral protamine Hagedorn (NPH) insulin before bedtime (usual starting dose 0.2 units/kg body weight) in response to elevated fasting glucose levels; while other women may need only short-duration insulin injections to cover postprandial hyperglycaemia10. In cases where both fasting and post-meal hyperglycaemia are evident, a multiple injection regimen combining intermediate- and short-duration insulin is administered. The total starting dose is usually 0.7 to 1.0 units/kg daily. Approximately 50% of the total daily insulin is given as NPH (at breakfast and before bedtime) and the remainder may be insulin lispro or aspart, both rapid-acting insulin analogues, before meals as needed. Short-acting analogues are safe and superior to regular insulin in reducing postprandial glucose spikes. Long-acting insulin analogues (insulin glargine and detemir) have been designed to more closely mimic basal insulin secretion, but neither has yet been extensively studied in women with gestational diabetes.

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Methodology to be developed

Observational, retrospective, longitudinal and descriptive study. We studied patients admitted with a diagnosis of gestational diabetes during the study period from January to December 2021, with associated obesity, evaluating metabolic control during pregnancy based on the treatment received with diet or insulin.

A sample of 50 patients was estimated and divided into two groups:

Group 1 (D)were the patients starting with diet, n = 25.

Group 2 (I) were patients starting with insulin, n = 25.

According to laboratory parameters, in the following determinations

Glucose (mg/dL) Glycosylated haemoglobin (%).

Results

A total of 50 patients with a diagnosis of Gestational Diabetes (GD) were selected, however, when calculating BMI, 4 of them (2 from each group) were found not to be obese and were therefore discarded from the study. Therefore, the total sample was 46 patients: 23 in the group that received "Diet" and 23 in the group that received "Insulin" as initial treatment. The mean age of the patients was 28.7 ± 6.5 years, BMI was 34.4 ± 5.2 kg/m2 and gestational age was 29.8 ± 3.9 weeks of gestation. The analysis by groups with respect to maternal age, gestational age and BMI is presented in table 1. Significant differences were observed only for gestational age. The Mann-Whitney U test was used because the distribution of this variable did not fit a Normal curve.

Variable	Diet group N: 23 M (DE)	Insulin group N: 23 M (DE)	p-value
Maternal age (years)	30 (7.4)	27.4(5.4)	0.179
Gestational age (weeks)	29.0 (3.2)	30.7 (4.4)	0.017
IMC (Kg/m^2)	37.5 (5.6)	37.3 (4.8)	0.956

Table 1 Mean (M) and standard deviation (SD) of maternal and gestational ages and BMI according to groups

Although it was observed that baseline blood glucose values in group I were higher than in group D, this difference was not significant. In contrast, and contrary to expectations, significance between groups was observed with respect to HbA1c, where it was higher in group D than in group I. These data are presented in table 2.

Variable	Group I M (DE)	Group D M (DE)	p-value
Blood glucose Basal (mg/dL)	177.5 (22.2)	160.1 (40.3)	0.076
HbA1c (%)	6.8 (1.1)	7.3 (1.1)	0.039

Table 2 Mean (M) and standard deviation (SD) of baseline blood glucose and HbA1c according to the groups

Diet group

Of the 23 patients who started on a diet, only 7 concluded the diet in a controlled manner. Twelve (52.2%) patients who started on diet were switched to insulin due to metabolic dyscontrol. This occurred between weeks 32 and 38 with an average of 34.7 ± 2.1. Nine patients showed glucose values of 140 mg/dL or higher in the first month of starting treatment. This group had an average glucose value of 147.7 ± 5.6 mg/dL. One patient had normal glucose values in the first month (119 mg/dL) but higher values (198 mg/dL) in the second month, so her treatment was also changed. Two patients were found to have blood glucose values below 140 mg/dL at all times and their treatment was changed. The remaining 11 (47.8%) patients concluded their treatment with diet. This group showed an average of 139.5 ± 33.9 mg/dL. These patients were kept on diet throughout the treatment and no high numbers (≥ 140 mg/dL) were observed in the subsequent months. However, this was not the case in 6 of them (mean: 162.1 mg/dL). Of these six, three were controlled in the second month, the other three remained with inadequate metabolic control. One of the patients who was controlled in the first month (133.0 mg/dL) increased to 140 mg/dL in the second month. Finally, these four patients had values below 110 mg/dL in the third month of their treatment. It is important to note that patients who did not show up for their evaluation in that month, or who had already completed their pregnancy, were grouped as "Non-assessed".

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Insulin group

No change was found in the 23 patients who received insulin as initial treatment. This group had an average of 144.9 ± 23.7 mg/dL in the first month from the start of treatment. This value is high because 13 patients remained uncontrolled. In the second month, 8 patients showed uncontrolled values; only one in the third month (144 mg/dL) and also one in the fourth month (150 mg/dL). The latter had shown acceptable values in the previous month (135 mg/dL) and is the only one who ended the pregnancy with abnormally high blood glucose levels. Two patients in this group could not be assessed at the end of pregnancy.

Conclusions

1. Of the 23 patients who started on a diet, only 30.4% (n=7) finished in a controlled manner on the same diet-only regimen. In contrast, of the 23 who started with insulin, 86.9% (n=20) ended up controlled.

2. 52.2% (n=12) of the patients who started on diet had to switch to insulin due to their metabolic dyscontrol. Of these, 10 ended up in a controlled manner. The change of treatment occurred between weeks 32 and 38 with an average of 34.7 weeks.

3. The degree of metabolic control in the patients was better in those who received insulin compared to those who were on diet alone.

4. Initial treatment with insulin in patients with Gestational Diabetes and Obesity is associated with better metabolic control than that obtained with diet.

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