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Short Report

Perinatal outcome in a Caucasian population with gestational diabetes and preexisting diabetes first diagnosed in pregnancy

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Abstract

Aim. – Our objective was to compare, in a Caucasian population, the perinatal outcomes of pregnancies complicated by pregestational diabetes diagnosed in the first-trimester of pregnancy with those of pregnancies complicated by gestational diabetes.

Methods. – A retrospective evaluation of maternal and neonatal outcomes was performed for all consecutive pregnancies complicated by gestational or pregestational diabetes that happened between 2005 and 2011. Pregestational diabetes was diagnosed for the first time in pregnancy if the first-trimester fasting glycaemia was ≥ 126 mg/dL. Gestational diabetes was diagnosed according to Carpenter–Coustan criteria until May 2010, and then according to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) panel criteria modified by the American Diabetes Association. A specific diet, self-monitoring of blood glucose and, if required, insulin treatment were prescribed.

Results. – Overall, 411 pregnant women were considered eligible for the study (379 with gestational diabetes and 32 with pregestational diabetes). Women with pregestational vs. gestational diabetes were diagnosed earlier in pregnancy (11.6 ± 1.0 weeks vs. 25.9 ± 1.7 weeks; $P = 0.0001$), had a higher mean first-trimester fasting glycaemic level (129.5 ± 3.6 mg/dL vs. 81.6 ± 10.5 mg/dL; $P = 0.0001$), more often had a family history of diabetes (46.9% vs. 25.9%; $P = 0.02$) and more often needed insulin treatment (78.1% vs. 14.0%; $P = 0.0001$). Furthermore, a higher rate of fetal malformations in women with pregestational diabetes was detected (9.4% vs. 1.6%, $P = 0.02$). No other differences in neonatal outcomes were identified.

Conclusion. – In a Caucasian population, the prevalence of fetal malformations and insulin requirements with pregestational diabetes first diagnosed in pregnancy were significantly higher compared with women with gestational diabetes. In any case, glucose impairment in pregnancy needs to be diagnosed in a timely fashion and appropriately treated to improve both maternal and fetal outcomes.

Keywords: Gestational diabetes; Perinatal outcome; Preexisting diabetes; Pregestational diabetes; Overt diabetes

1. Introduction

In 2010, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) proposed new criteria for diagnosing gestational diabetes mellitus (GDM) [1], based on an analysis of the Hyperglycaemiaand Adverse Pregnancy Outcome (HAPO) Study results [2], in an attempt to obtain worldwide consensus for GDM diagnosis. The IADPSG recommendations suggested considering as preexisting diabetes all patients with a fasting glycaemia ≥ 126 mg/dL or a randomly obtained value ≥ 200 mg/dL, or an HbA_{1c} level ≥ 6.5% (both confirmed by a fasting value), even if obtained during pregnancy.

This consideration partially clashes with the universally accepted definition of GDM as "every case of carbohydrate intolerance with onset or first recognition during pregnancy" [3], as it places pregestational diabetes into a new subgroup of glucose intolerance that might perhaps have characteristics between overt preexisting diabetes and GDM.

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Also, the clinical implications of using such a classification include an initial assessment of the most common diabetes-related complications, as well as closer supervision of glycaemic values and obstetric outcomes, all requiring a considerable outlay of resources [4].

Yet, there is a lack of evidence of any real clinical difference, in terms of perinatal outcomes, between overt diabetes first diagnosed in pregnancy (ODM) and GDM in a Caucasian population. Thus, the aim of the present study was to evaluate the clinical characteristics and perinatal outcomes in a population of Caucasian women with ODM in comparison to Caucasian women with GDM.

2. Materials and methods

This retrospective study was approved by the local ethics committee, and included all pregnant Caucasian women consecutively diagnosed with GDM at the outpatients' clinic for diabetes and pregnancy in the Department of Obstetrics and Gynaecology at the University of Messina, Italy, between 1st January 2005 and 31 December 2011. All patients gave their written informed consent to participate in the study. For each participant, information regarding family history of diabetes, prepregnancy body mass index (BMI), age, parity, gestational age and first-trimester fasting glycaemia value (routinely performed in Italy for all pregnant women) was collected. Diagnosis of GDM was made using the two-step approach and then by criteria proposed by Carpenter and Coustan [5] until May 2010, after which time the criteria proposed by the IADPSG panel, modified by the American Diabetes Association (ADA), were used [6]. ODM was defined as the presence of a first-trimester fasting glycaemia $\geq$ 126 mg/dL, as per previous ADA criteria for non-pregnant women [7].

Perinatal data, including insulin use during pregnancy, gestational age at birth, type of delivery, birth weight, weight increase at delivery, Apgar scores at 1 min and 5 min, neonatal hypoglycaemia and admission to the neonatal intensive care unit (NICU) were later collected from our clinical database, which recorded all outcomes for the participating pregnant women.

Non-Caucasian women, pregnant women with a previous diagnosis of diabetes, women with multiple pregnancies, women lacking first-trimester fasting glycaemia values and those with no information on perinatal outcomes were excluded from the study.

At the time of diagnosis, both women with GDM and those with ODM received recommendations for diet and physical activity, and a blood glucose meter to self-check their blood glucose values, according to standard care. Insulin therapy was started if blood glucose levels exceeded glucose targets (95 mg/dL for fasting glucose; 120 mg/dL after meals) [8].

2.1. Statistical analysis

The total sample was divided into two groups, according to glucose status during pregnancy (ODM and GDM). Their clinical characteristics were compared using the Chi^2 test for categorical variables and Kruskal–Wallis test for continuous variables. The risk of being treated with insulin in patients with ODM compared with GDM women was estimated by performing a multivariate analysis that included age, prepregnancy BMI, parity and family history of diabetes. A stepwise multivariate analysis using glucose status in pregnancy (GDM/ODM), age, prepregnancy BMI, parity and familial history of diabetes was also performed to identify factors associated with a composite adverse outcome, comprising macrosomia, hypoglycaemia and fetal malformation. A P value < 0.05 was considered statistically significant. All analyses were performed using SPSS version 17.0 software (SPSS Inc., Chicago, IL, USA).

3. Results

Over the 7 years covered by the study (2005–2011), 452 women with glucose impairment in pregnancy were diagnosed. Of these women, 41 were excluded from the study for a variety of reasons: 12 had multiple pregnancies; 15 were non-Caucasian; and 14 were lacking information on first-trimester glycaemia and/or perinatal outcomes.

Of the remaining 411 eligible patients, 379 cases of GDM and 32 cases of preexisting diabetes diagnosed in the first-trimester of pregnancy (ODM) were identified. Diabetes-related complications, such as retinopathy, renal impairment and cardiovascular complications, were looked for within 2 weeks of diagnosis and treated in those patients. The characteristics of the final two groups of patients are presented in Table 1. No statistically significant differences between the groups were found for age, prepregnancy BMI or parity, although a family history of diabetes was more often found in the ODM group. The latter women also started their care at an earlier gestational age, had a higher mean first-trimester fasting glycaemia and required insulin therapy more often than women with GDM. Weight increases in pregnancy, hypertensive disorders in pregnancy, gestational age at birth and mode of delivery were not significantly different between the two groups (Table 1).

Also, there were no statistically significant differences in neonatal outcomes, with the exception of a higher rate of fetal malformations in the ODM group (Table 1).

Multivariate analysis showed that a family history of diabetes ($\beta = 2.22$, $P = 0.01$) was associated with the composite adverse neonatal outcome, but had no detectable association with glucose status during pregnancy ($\beta = 2.24$, $P = 0.09$). However, patients with ODM had a fivefold greater risk of being treated with insulin compared with GDM women [odds ratio (OR) = 5.0; 95% confidence interval (CI): 2.3–10.6].

4. Discussion

Diabetes in pregnancy is a common and potentially serious condition. It can lead to adverse effects in both mothers and neonates [2], whereas the risk can be reduced by appropriate treatment [9,10].

GDM is defined as "[glucose] intolerance with onset or first identified in pregnancy" [3]. Until now, a proportion of these women were considered to have undiagnosed preexisting ODM and, according to the standard definition, were considered the