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Short Report

A pilot study of gestational diabetes mellitus not controlled by diet alone: First-line medical treatment with myoinositol may limit the need for insulin

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Abstract

Aim. – This study assessed whether myoinositol might be a first-line medical treatment for gestational diabetes mellitus (GDM).

Methods. – For 12 months, women with GDM not controlled by diet ($n = 32$) were prospectively treated with myoinositol 1200 mg and folic acid 400 μg/day, while consecutive women ($n = 28$) with insulin-requiring GDM treated during the previous year at our centre constituted the control group. Baseline characteristics and care were similar in both groups.

Results. – Insulin was required in eight women (25%) in the myoinositol group who, compared with the 24 who did not need insulin, were older (37 ± 5 vs. 32 ± 5 years, respectively; $P = 0.018$) and had a larger percentage of high self-monitored glucose values (45 ± 8% vs. 32 ± 14%; $P < 0.0001$) during the week prior to the introduction of myoinositol treatment. All of the women had similar pregnancy outcomes regardless of their GDM management, although less labour induction was required in the myoinositol group (OR: 0.22 [0.07–0.65]), which had no side effects.

Conclusion. – This pilot study suggests that myoinositol may be a safe first-line medical treatment for uncontrolled GDM.

Keywords: Gestational diabetes mellitus; Myoinositol; Pregnancy; Diabetes; Macrosomia; Insulin

1. Introduction

Gestational diabetes mellitus (GDM) is a worldwide public-health problem associated with fetal, newborn and maternal risks. Its prevalence is expected to increase as the epidemic of obesity continues [1]. Recently, the International Diabetes Federation estimated that, worldwide, 16% of live births in 2013 were complicated by hyperglycaemia during pregnancy (see http://www.idf.org/diabetesatlas). Therefore, safe, effective, acceptable, simple and inexpensive interventions to treat GDM are required. GDM is characterized by an increase in physiological insulin resistance, which is an interesting therapeutic target. Oral myoinositol (MI) is an isomer of the alcohol sugar C6 involved in insulin signaling as a second messenger in phosphatidylinositol transduction. MI is physiologically synthesized by the liver and present in food and, therefore, is considered a dietary supplement [2]. Oral supplementation with MI has been shown to safely reduce insulin resistance in pregnant women with polycystic ovarian syndrome (PCOS) [3] and to prevent GDM [4]. The present observational pilot study aimed to explore the effectiveness and safety of MI compared with insulin as a first-line treatment for uncontrolled GDM.

2. Methods

At a single centre (Clinique de l'Étoile) in Aix-en-Provence, France, the study prospectively considered women:

Abbreviations: GDM, gestational diabetes mellitus; MI, myoinositol.

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Table 1
Baseline characteristics and outcomes in pregnant women according to insulin and myoinositol (MI) treatment.

	Total ($n=60$)	Insulin ($n=28$)	MI ($n=32$)	P
Baseline characteristics				
Age (years)	33.7 ± 5.0	34.2 ± 4.6	33.3 ± 5.4	0.462
Body mass index (kg/m^2)[a]	27.3 ± 6.1	26.5 ± 5.1	27.9 ± 6.8	0.401
Pregravid obesity (%)	21 (35.0)	8 (28.6)	13 (40.6)	0.329
Family history of T2D (%)	32 (60.4)	14 (63.8)	18 (58.1)	0.683
Personal history of macrosomic infant (%)[b]	7 (22.6)	5 (33.3)	2 (12.5)	0.166
Personal history of GDM (%)[b]	18 (58.1)	9 (60.0)	9 (56.3)	0.833
History of miscarriage (%)	7 (13.0)	3 (13.0)	4 (12.9)	0.988
Smoking (%)	2 (3.5)	0 (0)	2 (6.5)	0.187
Diagnostic OGTT				
Fasting plasma glucose (mg/dL)	96 ± 9	95 ± 10	97 ± 8	0.363
1-h plasma glucose (mg/dL)	178 ± 27	169 ± 29	187 ± 24	0.129
2-h plasma glucose (mg/dL)	170 ± 21	174.4 ± 18	163 ± 24	0.195
Insulin need				
At time of delivery (%)	36 (60)	28 (100)	8 (25)	< 0.001
Pregnancy outcomes				
Total gestational weight gain (kg)	7.5 ± 6.4	7.6 ± 6.6	6.3 ± 7.5	0.903
Gestational weight gain after treatment (kg)	2.0 ± 4.1	2.3 ± 4.4	1.8 ± 4.0	0.694
Birth weight (g)	2401 ± 380	3343 ± 348	3452 ± 404	0.272
Birth weight > 4000 g (%)	5 (8.3)	1 (3.6)	4 (12.5)	0.212
Large-for-gestational-age infant (%)	6 (10.0)	1 (3.6)	5 (15.6)	0.121
Gestational hypertension (%)	1 (1.7)	0 (0)	1 (3.2)	0.338
Preeclampsia (%)	1 (1.7)	1 (3.6)	0 (0)	0.289
Prematurity before gestational week 37 (%)	1 (1.7)	0 (0)	1 (3.1)	0.346
Gestational age at delivery (weeks)	38.9 ± 0.9	38.8 ± 0.6	39.0 ± 1.1	0.377
Labour induction (%)	27 (45.0)	18 (64.3)	9 (28.1)	0.005
Caesarean section (%)	17 (28.3)	6 (21.4)	11 (34.4)	0.206

T2D: type 2 diabetes; OGTT: oral glucose tolerance test.
[a] At time of diagnosis of gestational diabetes mellitus (GDM).
[b] Parous women.

- diagnosed with early GDM, GDM or overt diabetes, according to International Association of Diabetes and Pregnancy Study Groups criteria, which were endorsed in France [5,6];
- with singleton pregnancies;
- whose glucose values remained uncontrolled after at least 7 days of lifestyle changes according to French recommendations (defined as at least three self-monitored fasting glucose values per week > 95 mg/dL and/or > 120 mg/dL at 2 h after meals) [6].

From March 2014 to March 2015, women were first supplemented with MI 600 mg and folic acid 200 μg twice a day (INOFOLIC®, Laboratoires Genevrier, Antibes Juan-les-Pins, France). MI was assessed for clinical tolerance, efficacy and acceptability by email or telephone contact during the first week of treatment, and throughout the pregnancy during routine visits. In the MI group, insulin was initiated if diabetes was not controlled [6]. When insulin became necessary, MI was stopped. Also assessed were the following pregnancy outcomes: gestational weight gain; birth weight; gestational hypertension; preeclampsia; birth term; and mode of delivery. The control group included women who met the same inclusion criteria, who had insulin-requiring GDM and who delivered consecutively in 2012.

3. Results

Table 1 presents the baseline characteristics of all the study women (28 in the insulin group, 32 in the MI group), which were similar. Glucose values at the time of GDM diagnosis were also similar, including two women with overt diabetes discovered during pregnancy (one in each group), and 20 (62.5%) and 16 (57.14%) women with early GDM (before gestation week 24) in the MI and insulin groups [6], respectively.

Insulin therapy was necessary in eight (25%) women in the MI group. These eight women, compared with the 24 who did not need insulin, were older (37 ± 5 vs. 32 ± 5 years, respectively; $P = 0.018$) and had a larger percentage of high self-monitored glucose values during the week prior to MI introduction (45 ± 8 vs. 32 ± 14%, respectively; $P < 0.0001$).

All of the women had similar pregnancy outcomes whatever the treatment strategy (Table 1), except for less frequent labour induction in the MI group than in the insulin group (odds ratio: 0.22 [0.07–0.65]). MI supplementation was well tolerated