



Original Article

Effects of maternal age, parity and pre-pregnancy body mass index on the glucose challenge test and gestational diabetes mellitus



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المخلص

أهداف البحث: يهدف البحث لدراسة تأثير العمر، وعدد الولادات ومعامل كتلة الجسم على اختبار التحدي للجلوكوز ٥٠ غرام الإيجابي وسكري الحمل لدى السيدات الحوامل العمانيات السليمات.

طرق البحث: أُستخدم ٥٠ غراما من الجلوكوز لإجراء اختبار التحدي للجلوكوز على ٣٠٧ سيدة عمانية حامل سليمة خلال الأسبوع ٢٤-٢٨ من الحمل. أُعتبر اختبار التحدي للجلوكوز إيجابيا إذا كان مستوى الجلوكوز في الدم < ٧.٨ ملمول/ل، عند قياسه بعد ساعة واحدة. وتم تأكيد تشخيص السيدات بسكري الحمل باختبار تحمل الجلوكوز عن طريق الفم بعد ساعتين من استخدام ٧٥ غراما من الجلوكوز، عندما يكون أي من قيمة الاختبار عند الصوم أو بعد ساعتين من تناول ٧٥ غراما من الجلوكوز < ٥.٥ ملمول/ل و < ٨ ملمول/ل، على التوالي، تعتبر السيدات مصابات بسكري الحمل.

النتائج: تم اختبار ٣٠٧ سيدة، وتحديد ٨٣ (٢٧,٠٣%) سيدة لديها اختبار إيجابي، و ٢٣ (٧,٥%) حالة إيجابية لسكري الحمل. يزداد اختبار التحدي للجلوكوز الإيجابي وسكري الحمل بشكل كبير مع زيادة عمر الأم، من ٢٠% و ٢,٢% على التوالي، لدى السيدات اللاتي أعمارهن ≤ ٢٥ عاما إلى ٣٧,٨% و ١٤,٧% على التوالي، عند السيدات اللاتي أعمارهن < ٣٥ عاما. كما يزداد اختبار التحدي للجلوكوز الإيجابي وسكري الحمل بشكل كبير مع زيادة معامل كتلة الجسم قبل الحمل من ١٩,٨% و ٣,٨% على التوالي، لدى السيدات بمعامل كتلة الجسم ≤ ٢٥ كجم/م^٢ إلى ٣٧,٨% و ٩,٩%، على التوالي عند السيدات بمعامل كتلة الجسم < ٢٥ كجم/م^٢.

الاستنتاجات: عمر الأمهات ومعامل كتلة الجسم قبل الحمل لهما تأثير كبير على اختبار التحدي للجلوكوز ٥٠ غرام الإيجابي وسكري الحمل.

الكلمات المفتاحية: العمر؛ معامل كتلة الجسم؛ سكري الحمل؛ اختبار التحدي للجلوكوز؛ عدد الولادات

Abstract

Objectives: To study the effects of age, parity and body mass index (BMI) on the incidence of a positive 50 g glucose challenge test (OGCT) and gestational diabetes mellitus (GDM) in healthy pregnant Omani women.

Methods: A 50 g OGCT was performed on 307 healthy pregnant Omani women at 24–28 weeks of gestation. When the venous plasma glucose concentration (VPG) reached >7.8 mmol/l after 1 h, the OGCT was considered to be positive. Women with positive OGCTs had a confirmatory diagnosis of GDM, which was established by performing a 2-h 75 g oral glucose tolerance test (OGTT). When either fasting or post-2-h 75 g OGTT values were >5.5 mmol/l or >8 mmol/l, respectively, women were considered diabetic.

Results: This study screened 307 women and identified 83 (27.03%) OGCT-positive and 23 (7.5%) GDM-positive cases. The incidences of a positive OGCT and GDM increased significantly with increasing maternal age from 20.0% to 2.2%, respectively, in women aged ≤ 25 years to 37.8% and 14.7%, respectively, in women aged >35 years ($p = 0.02$ and $p = 0.009$, respectively). The incidences of a positive OGCT and GDM increased markedly with increasing pre-pregnancy BMI, from 19.8% to 3.8%, respectively, in women with BMIs ≤ 25 kg/m² to 37.8% and 9.9%, respectively, in women with BMIs >25 kg/m² ($p = 0.02$ and $p = 0.04$, respectively).

Conclusion: Maternal age and pre-pregnancy BMI have profound effects on the incidences of a positive OGCT and GDM.

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Introduction

Gestational DM is defined as carbohydrate intolerance that is diagnosed for the first time during pregnancy and usually disappears after the puerperium.¹ The incidence of GDM varies from 1.2% in Sweden to 22.3% in Sardinia, depending on the criteria used for diagnosing GDM.^{2,3} Gestational DM adversely affects both the mother and the foetus. Maternal adverse effects include maternal vasculopathy, pre-eclampsia, and genital and urinary tract infections. Foetal adverse effects include macrosomia, intrauterine growth restriction, congenital malformation, and intrauterine foetal death.^{4–6} Babies born to diabetic mothers are more likely to develop respiratory distress syndrome, hypoglycaemia, jaundice and birth trauma.⁷ Women with GDM and their children are at an increased risk of developing type 2 diabetes early in their lives.⁸

The OGTT is considered, by many, as the gold standard for the diagnosis of DM.⁹

It has been reported that positive OGCTs and GDM are common in women aged ≥ 30 years, BMI ≥ 25 kg/m², and parity ≥ 4 .¹⁰

The study intends to determine whether maternal age, parity and pre-pregnancy BMI are associated with a positive OGCT and GDM in Omani women.

Materials and Methods

This report describes a prospective study conducted at the department of Obstetrics and Gynaecology, Sultan Qaboos University Hospital (SQUH), Muscat, Sultanate Oman between 15 September 2013 and 14 September 2014. This study was approved by the ethical committee at Sultan Qaboos University.

In this study, all healthy pregnant Omani women with singleton pregnancies that were not diabetic and attended the antenatal clinic at SQUH were studied. All women in this study who were not at an increased risk of developing DM had random blood sugar analyses performed upon booking a visit as early as possible during pregnancy (usually between 6 and 8 weeks gestation). If the results showed a VPG level >7.8 mmol/l, then the 2-h 75 g OGTT was performed to diagnose covert pre-gestational diabetes mellitus (PGDM).

Pregnant women who were at an increased risk of developing DM and were not known to be diabetic (such as those with a previous history of macrosomic baby, recurrent miscarriages, unexplained intrauterine foetal death, congenital foetal malformations, previous GDM and a family history of DM) received the 2-h 75 g OGTT upon booking a visit. If the fasting or the 2-h VPG level exceeded 5.5 and 8 mmol/l,

Table 1: Results of the 50 g OGCT and GDM in different age groups.

Age (n = 307) n (%)	Positive OGCT ^a (n = 83) n (%)	GDM (n = 23) ^b n (%)
15–19 years, 5 (1.6)	1 (20.0)	0 (0)
20–25 years, 5 (24.5)	15 (20.0)	2 (2.7)
26–30 years, 99 (32.4)	21 (21.2)	5 (5.1)
31–35 years, 66 (21.4)	23 (34.8)	7 (10.6)
>35 years, 61 (20.1)	23 (37.8)	9 (14.7)

^a OGCT = oral glucose challenge test.

^b OGTT = oral glucose tolerance test.

respectively, then the woman was diagnosed as having PGDM. All remaining women, whether at an increased risk of GDM or not, had the 50 g OGCT performed between 24 and 28 weeks gestation. Fasting is not required to perform this test. If the 1-h VPG level was >7.8 mmol/l, then the test was considered positive. Women with a positive OGCT screening test underwent a 75 g 2-h OGTT, which is the diagnostic test for GDM. If either fasting or 2-h VPG exceeded 5.5 and 8 mmol/l, respectively, then the woman was considered as having GDM.

Weight gain during pregnancy was between 8 and 13 kg and the HbA1C values in all women were below 6% as women with HbA1C values $>6\%$ were excluded from the study.

The data collected included maternal age, gestational age at screening, parity and BMI at booking. We assumed that BMI at booking, which usually occurs between 6 and 8 weeks of gestation, is similar to pre-pregnancy BMI as pregnant women are not expected to have gained weight at this early gestational age. Foetal and maternal risk factors that may be attributed to diabetes mellitus, such as unexplained stillbirth, macrosomic baby (birth weight > 4000 g), and a previous history of GDM, a family history of DM in first degree relatives, recurrent miscarriages, and polyhydramnios, were studied.

Women who were found to be diabetic were treated with either diet modification alone or with metformin. Only 15% of the women needed insulin treatment.

Statistical analysis was performed using the Chi-square test, the Mann–Whitney test and Fisher's exact test where appropriate. The differences between the values were considered significant when $P \leq 0.05$.

Results

In this study, 307 pregnant women were screened during pregnancy between 24 and 28 weeks with the 50 g OGCT. Of these subjects, 83 women (27.1%) had positive OGCT results. Pregnant women with positive OGCT results underwent a 75 g 2-h OGCT. 23 of these women (7.5%) were found to have abnormal OGCT results and were diagnosed as having GDM.

Table 1 shows the results of positive OGCTs and GDM in different age groups. In women aged 20–25 years, 15 (20%) had positive OGCTs and 2 (2.7%) were found to have GDM.

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