Journal of Psychosomatic Research xxx (2015) xxx–xxx

Contents lists available at ScienceDirect

Journal of Psychosomatic Research

A cross-sectional study of antenatal depressive symptoms in women at high risk for gestational diabetes mellitus

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ARTICLE INFO

Article history:
Received 27 January 2015
Received in revised form 24 May 2015
Accepted 27 May 2015
Available online xxxx

Keywords:
Pregnancy
Gestational diabetes mellitus
Antenatal depression
Depressive symptoms

ABSTRACT

Objective: To examine differences in antenatal depressive symptoms between women at high risk for gestational diabetes mellitus (GDM) and pregnant women in the general population.
Methods: We recruited pregnant women at high risk for GDM, based on a history of GDM and/or prepregnancy BMI ≥ 30 kg/m^2, (n = 482) and pregnant women in the general population (n = 358) before 20 weeks of gestation. Depressive symptoms were assessed by the Edinburgh Postnatal Depression Scale (EPDS).
Results: Of the women at high risk for GDM, 17% had an EPDS score ≥ 10 (indicating risk for depression) compared to 11% of the pregnant women in the general population ($p = .025$). The mean EPDS score was also higher in the women at risk for GDM (5.5, SD 4.5 vs. 4.6, SD 3.9, $p = .004$, effect size 0.21 [95% CI: 0.07 to 0.34]). After adjusting for age, prepregnancy BMI and income, the difference between the groups was no longer significant either in the proportion of women having an EPDS score ≥ 10 ($p = .59$) or in the mean EPDS score ($p = .39$).
Conclusion: After controlling for age, prepregnancy BMI and income, women at high risk for GDM did not have greater depressive symptoms compared to pregnant women in the general population in early pregnancy.

Introduction

Antenatal depression (AD) is associated with a number of negative health outcomes including preterm birth, low birth weight and decreased breastfeeding initiation [1,2]. Untreated AD is also one of the greatest risk factors for postpartum depression (PPD) [3,4], which in turn is associated with paternal depression [5], poor maternal–infant interaction [6], and may affect infant development [7]. The prevalence rates for AD vary widely between studies with systematic reviews reporting rates of 7% and 11% for the first trimester, and 9% and 13% for the second and third trimesters [8,9].

Gestational diabetes mellitus (GDM) is associated with negative consequences including a predisposition to the development of metabolic syndrome and type 2 diabetes for both the mother and offspring [10,11]. Increasing prepregnancy body mass index (BMI) is directly associated with the risk of GDM [12], and a history of GDM is another important risk factor of developing GDM in a subsequent pregnancy [13]. The prevalence of depression has been shown to be higher in people with type 1 or type 2 diabetes compared to those without [14]. Although both depression and GDM are common during pregnancy, AD in women with GDM has not been extensively studied [15]. Identifying the prevalence of depressive symptoms in women at high risk for GDM is also important because depression may affect adherence to prevention strategies, such as lifestyle changes, and later to treatment of GDM. We therefore examined differences in depressive symptoms between pregnant women at high risk for GDM, based on a history of

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http://dx.doi.org/10.1016/j.jpsychores.2015.05.015
0022-3999/

GDM and/or prepregnancy obesity, and pregnant women in the general population.

Materials and methods

Study design

In this cross-sectional study, we examined baseline data from The Finnish Gestational Diabetes Prevention Study (RADIEL). The objective of the RADIEL study, a multi-center randomized controlled trial conducted in a primary care setting, was to assess the efficacy of a lifestyle intervention in preventing GDM. The RADIEL study was carried out between the years 2008 and 2014 in the maternity hospitals of the Helsinki metropolitan area in Southern Finland and in Lappeenranta in Southeastern Finland. The study protocol has been described in greater detail elsewhere [16]. The Ethical Boards of the Helsinki University Central Hospital and the South-Karelia Central Hospital approved the study protocol, and the protocol was registered at clinicaltrials.gov (NCT01698385).

Recruitment of women at high risk for gestational diabetes

Women with a history of GDM and/or prepregnancy BMI ≥ 30 kg/m^2, either planning pregnancy or pregnant before 20 weeks of gestation, were eligible to participate in the RADIEL study. Women with prepregnancy BMI ≥30 kg/m^2 were primarily recruited in antenatal clinics when attending the first trimester ultrasound examination, and women with a prior GDM by personal invitation letters sent out based on hospital registries. In addition, notices in antenatal clinics, newspapers and social media were used in the recruitment. We excluded women with diabetes diagnosed before pregnancy, medication influencing glucose metabolism (e.g. oral cortisone and metformin), multiple pregnancy, physical disability, current substance abuse, severe psychiatric disorder, or significant co-operation difficulties (e.g. inadequate language skills), and women younger than 18 years old. All participants signed an informed consent form. In this cross-sectional study, we included the pregnant women, but not the women planning pregnancy, recruited for the RADIEL study.

Recruitment of pregnant women in the general population

Pregnant women in the general population were recruited by handing out a letter of invitation to participate in the study, background information and depression questionnaires, and a stamped envelope to 750 sequential women who attended the first ultrasound examination performed between gestational weeks 10 and 13 in the same maternity hospitals as where the women at high risk for GDM were recruited. The ultrasound examination is part of the public antenatal care program, and is offered to all pregnant women in Finland. Women with a confirmed vital pregnancy on ultrasound and who returned the questionnaires were eligible to participate. We excluded women who completed the depression questionnaire after gestational week 19. All participants signed an informed consent form.

Demographics

Among the women at high risk for GDM, self-reported prepregnancy weight was collected from maternity care cards and height measured by a study nurse, whereas among the pregnant women in the general population, self-reported prepregnancy weight and height were collected with a questionnaire. In addition, information on socioeconomic status, self-reported morbidity, use of medication and smoking status were collected with a questionnaire, or among the high-risk women sometimes by an interview by a study nurse.

Depressive symptoms

Depressive symptoms were assessed by the Edinburgh Postnatal Depression Scale (EPDS) [17]. The EPDS is self-administered and consists of 10 items, each scored from 0 to 3. The EPDS is designed to screen for PPD but is also validated as a screening tool for depression during pregnancy and named Edinburgh Depression Scale [18–20]. The EPDS validation studies during pregnancy recommend a wide range of cut-off scores; in this study, we chose a cut-off level of ≥10 to indicate risk for depression. The RADIEL study nurses were advised to refer a participant for further assessment of depression if the total EPDS score of ≥10 was reached. In addition, any woman at high risk for GDM who responded to the question "in the past seven days, the thought of harming myself has occurred to me" with "hardly ever", "sometimes," or "yes, quite often," was evaluated clinically for depression. An open-ended response option was added as an alternative to the standard response options in EPDS items 4 (about specific reasons for being anxious or worried), and 5 (about specific reasons for feeling scared or panicky) for the women at high risk for GDM. Some women filled out only the open-ended responses, but not the standard response options in the EPDS items 4 and 5, and therefore the open-ended responses (98 in item 4 and 50 in item 5) were considered as missing data in the analyses.

Statistical analyses

The data are presented as means (M) with standard deviations (SD) or as counts with percentages. The comparisons in characteristics between the women at high risk for GDM and the pregnant women in the general population were made by *t*-test, bootstrapped type *t*-test, permutation test, chi-square test or Fisher–Freeman–Halton test, when appropriate. A multiple imputation (multivariate imputation by chained equations) method was applied to fill in missing values for the EPDS; we independently analyzed 5 copies of the data, each with missing values suitably imputed, in the multivariate ordinal logistic regression analyses. The difference between the women at high risk for GDM and the pregnant women in the general population in the proportion of women having an EPDS score ≥10 was tested by logistic regression analysis (adjusted for age, prepregnancy BMI and income). The difference in the total EPDS score was tested by bootstrapped type analysis of covariance (adjusted for age, prepregnancy BMI and income) with Hochberg's approach for multiple comparisons, and effect size ("d") was calculated by using the method of Hedges's. Effect size of 0.20 was considered small, 0.50 medium, and 0.80 large. Confidence intervals (CI) for the effect size were obtained by bias-corrected bootstrapping (5000 replications). Data analyses were carried out using Stata statistical software, release 13.1 (StataCorp, College Station, TX, USA).

Covariates

Based on previous studies, risk factors for AD include young age, low self-esteem, low social support, unwanted pregnancy, low educational attainment and income, a previous history of depression, major life events and higher prepregnancy BMI [21–24]. We chose age, prepregnancy BMI and family income as covariates because the two groups of women in our study differed in those characteristics. Pregnancy involves weight gain, and thus we did not control for current BMI; gestational weight gain was not chosen as a covariate because women in our study were at their first half of pregnancy. We did not control for chronic disease (yes/no) because a rather small number of the women reported having a chronic disease, and gestational weeks was not chosen because, although statistically significant, the difference between the groups is not considered to be clinically meaningful. All the possible confounders were not available in our data.

Please cite this article as: Engberg E, et al, A cross-sectional study of antenatal depressive symptoms in women at high risk for gestational diabetes mellitus, J Psychosom Res (2015), http://dx.doi.org/10.1016/j.jpsychores.2015.05.015