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Diabetes & Metabolism 40 (2014) 67–75

Original article

Physical activity before and during pregnancy and risk of abnormal glucose tolerance among Hispanic women

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Received 5 June 2013; received in revised form 16 September 2013; accepted 19 September 2013

Abstract

Aim. – Women diagnosed with abnormal glucose tolerance and gestational diabetes mellitus are at increased risk for subsequent type 2 diabetes, with higher risks in Hispanic women. Studies suggest that physical activity may be associated with a reduced risk of these disorders; however, studies in Hispanic women are sparse.

Methods. – We prospectively evaluated this association among 1241 Hispanic participants in Proyecto Buena Salud. The Pregnancy Physical Activity Questionnaire was used to assess pre, early, and mid pregnancy physical activity. Medical records were abstracted for pregnancy outcomes.

Results. – A total of 175 women (14.1%) were diagnosed with abnormal glucose tolerance and 57 women (4.6%) were diagnosed with gestational diabetes. Increasing age and body mass index were strongly and positively associated with risk of gestational diabetes. We did not observe statistically significant associations between total physical activity or meeting exercise guidelines and risk. However, after adjusting for age, BMI, gestational weight gain, and other important risk factors, women in the top quartile of moderate-intensity activity in early pregnancy had a decreased risk of abnormal glucose tolerance (odds ratio = 0.48, 95% Confidence Interval 0.27–0.88, $P_{trend} = 0.03$) as compared to those in the lowest quartile. Similarly, women with the highest levels of occupational activity in early pregnancy had a decreased risk of abnormal glucose tolerance (odds ratio = 0.48, 95% Confidence Interval 0.28–0.85, $P_{trend} = 0.02$) as compared to women who were unemployed.

Conclusion. – In this Hispanic population, total physical activity and meeting exercise guidelines were not associated with risk. However, high levels of moderate-intensity and occupational activity were associated with risk reduction.

Keywords: Epidemiology; Gestational diabetes; Hispanic; Physical activity; Prospective

1. Introduction

Both gestational diabetes mellitus (GDM) and milder glucose intolerance in pregnancy identify women who are at high risk for type 2 diabetes [1,2]; women with a history of GDM have a 7-fold risk for future type 2 diabetes [3]. Recently, studies designed to identify the diagnostic threshold between maternal hyperglycemia and adverse perinatal outcomes have observed a consistent, continuous increase in risk of adverse pregnancy outcomes over the range of maternal blood glucose levels, even at degrees not diagnostic of GDM [4].

Epidemiologic studies have been fairly consistent in showing a reduced risk of GDM for women who were active prior to pregnancy, while studies of activity during pregnancy have been somewhat less consistent [5]. However, these studies faced a number of limitations. The majority failed to use a physical activity questionnaire validated among pregnant women, limited their assessment to recreational activities only, measured activity only once during pregnancy or relied on measures of activity collected after pregnancy [6]. In addition, most studies were conducted among predominantly non-Hispanic white women [5]. During pregnancy, household and occupational activities constitute a significant proportion of physical activity [7], particularly among Hispanic women who report generally low levels of recreational physical activity during pregnancy [8].

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1262-3636/$ – see front matter
http://dx.doi.org/10.1016/j.diabet.2013.09.005

The American College of Obstetricians and Gynecologists (ACOG) recommends that pregnant women, in the absence of contraindications, engage in 30 minutes or more of physical activity of at least moderate intensity on most, if not all, days of the week [9]. Hispanics are half as likely as non-Hispanics whites to meet ACOG guidelines [8]. This is critical as Hispanics are the largest minority group in the U.S., with the highest birth and immigration rates of any minority group [10]. Hispanics from the Caribbean islands (i.e., Puerto Ricans and Dominicans) are the 2nd largest group of Hispanics living in the U.S. [10], the fastest growing subgroup, and the largest Hispanic subgroup in the northeast U.S. [11,12]. As compared to other Hispanics, Puerto Ricans and Dominicans experience the greatest health disparities, the highest prevalence of type 2 diabetes, and exhibit more adverse health behaviors such as poor nutrition [13–15].

Therefore, our objective was to prospectively examine the relationship between physical activity during pre, early, and mid pregnancy and risk of abnormal glucose tolerance (AGT) and GDM.

2. Methods

2.1. Setting

Proyecto Buena Salud was based in the ambulatory obstetrical practices of Baystate Health, an integrated health system in Western Massachusetts from 2006 to 2011. Details of the study have been previously published [16]. Briefly, the overall goals were to evaluate the association between psychosocial stress, physical activity and risk of GDM among Hispanic women. Bilingual interviewers recruited patients at a prenatal care visit early in pregnancy (up to 20 weeks gestation), informed them of the aims and procedures of the study, and obtained written informed consent as approved by the Institutional Review Boards of the University of Massachusetts-Amherst and Baystate Health. Interviews were conducted in Spanish or English (based on patient preference) in order to eliminate potential language or literacy barriers.

At the time of enrollment (mean = 12.4 weeks gestation), interviewers collected information on socio-demographic, acculturation, and behavioral factors including pre-pregnancy physical activity (one year prior to the pregnancy). Information on behavioral factors was updated in mid pregnancy (mean = 21.3 weeks gestation). After delivery, medical records were abstracted for medical and obstetric history and clinical characteristics of the current pregnancy.

2.2. Eligibility

Eligibility was restricted to women of Puerto Rican or Dominican Republic heritage (Caribbean Islanders). Women who:

- were themselves born in the Caribbean Islands, or;
- had a parent born in the Caribbean Islands, or;
- had at least 2 grandparents born in the Caribbean Islands were included.

Additional exclusion criteria included:

- current medications thought to adversely influence glucose tolerance;
- multiple gestation;
- history of diagnosis of diabetes, hypertension, heart disease or chronic renal disease;
- < 16 years of age or over 40 years of age.

A total of 1626 prenatal care patients were enrolled in Proyecto Buena Salud. For the current analysis, we excluded participants who experienced a miscarriage, did not deliver at Baystate, were not screened for GDM, or were missing information on physical activity during all pregnancy time periods resulting in a final sample of 1241 participants (Fig. 1). Reasons for missing physical activity information during pregnancy included lack of time due to being called into the medical exam, inability to locate women at the clinic or over the telephone (e.g., due to disconnected telephone), and preterm delivery.

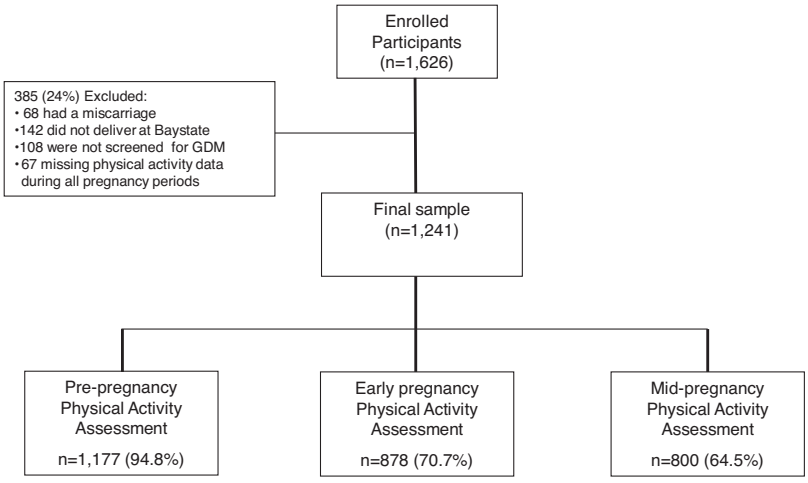

Fig. 1. Recruitment and retention of participants; Proyecto Buena Salud, Western Massachusetts, 2006–2011.