The Relationship Between Gestational Diabetes and Antenatal Depression

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ABSTRACT

Objective: To determine whether women with gestational diabetes mellitus (GDM) had more symptoms of depression than women without GDM. A secondary aim was to determine if factors predictive of symptoms of depression in women with GDM were different than women without GDM.

Design: A cross sectional, descriptive design was used.

Setting: An outpatient clinic at an academic medical center.

Participants: The sample included 135 pregnant women between 24 and 40 weeks gestation, of which 65 had GDM and 70 did not.

Methods: The Edinburgh Postnatal Depression Screen (EPDS) was used to measure symptoms of depression in pregnant women attending routine prenatal care visits. Descriptive statistics, logistic regression, and multiple regressions were done to analyze the data.

Results: Twenty percent of women with GDM and 13% of women without GDM had significant symptoms of depression. Women with GDM were 3.79 times more likely to have a history of depression (95% confidence interval [CI] [1.07, 13.45], $p = .04$) than women without GDM after controlling for age, income, marital status, body mass index, and gravida. Trait anxiety and perceived stress were significant predictor factors of symptoms of depression ($R^2 = .82$, $p < .001$) for women with and without GDM.

Conclusions: Results suggest that symptoms of depression are common during the antepartum period, thus assessment and education regarding this disorder are important. In addition, a history of depression may be a risk factor for the development of GDM.

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Depression affects approximately 121 million people making it the leading cause of disability worldwide (World Health Organization [WHO], 2009). Depression is more common in women than in men and is the primary cause of disease burden in developed and developing countries for childbearing aged women (WHO, 2009). Between 9.9% and 20% of women have depression during pregnancy (Bonari et al., 2004; Melville, Gavin, Guo, Fan, & Katon, 2010), and some researchers have reported rates of antenatal depression as high as 45% (Lindgren, 2001; Orr, Blazer, & James, 2006, 2007).

Gestational diabetes mellitus (GDM) (defined as glucose intolerance first diagnosed during pregnancy) is a substantial problem in the United States, occurring in up to 9.2% of all pregnancies (DeSisto, Kim, & Sharma, 2014). Gestational diabetes rates are increasing, and there was a 122% increase between 1989 and 2004 (Getahun, Nath, Ananth, Chavez, & Smulian, 2008). It was esti-mated that each year more than 200,000 pregnancies are complicated by GDM (American Diabetes Association, 2010).

The relationship between depression and diabetes appears to be bidirectional and can be explained by psychosocial factors and physiologic mechanisms shared by these comorbid conditions. For example, initially it was thought the depression observed in persons with diabetes was due to the psychosocial demands of living with this chronic illness. However, more contemporary thinking suggests that having depression makes self-management of diabetes more challenging which contributes to the difficulty in achieving good glycemic control (Penckofer, Doyle, Byrn, & Lustman, 2014). Physiological mechanisms of inflammation are also shared by these comorbid conditions. Diabetes is associated with inflammation that is often due to insulin resistance (Bastard et al., 2006). Persons who are depressed are often obese or have insulin resistance. However,

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depression itself can be associated with proinflammatory cytokines (Dantzer, O'Connor, Freund, Johnson, & Kelley, 2008; Raison, Capuron, & Miller, 2006; Wichers & Maes, 2002). These cytokines can alter the metabolic pathway of tryptophan by shunting it away from serotonin synthesis and may explain the neurodegeneration observed in depression (Myint & Kim, 2003). Thus, the relationship between depression and diabetes is reciprocal, and the adverse outcomes that occur as a result of having these conditions cannot usually be attributed to one disease over the other.

Despite the relationship between depression and type 2 diabetes, there is limited research on the association between depression and GDM (Byrn & Penckofer, 2013). Results from five studies indicated that more women with GDM have depression or significant symptoms of depression compared to women without diabetes during pregnancy (Backes Kozhimannil, Pereira, & Harlow, 2009; Chazotte, Freda, Elovitz, & Youchah, 1995; Katon, Russo, Gavin, Melville, & Katon, 2011; Kim, Brawarsky, Jackson, Fuentes-Afflick, & Haas, 2005; Langer & Langer, 1994). However, only one of the studies included results which showed that women with diabetes had significantly more depression than women without diabetes (Backes Kozhimannil et al., 2009). This study included a large sample of women ($n = 11,024$) enrolled in Medicaid; the investigators found that after controlling for age, race, and preterm birth, 15.2% of women with preexisting and GDM during pregnancy reported symptoms of depression compared to 8.5% of women without diabetes (odds ratio [OR] = 1.85, 95% confidence interval [CI] [1.45, 2.36]) (Backes Kozhimannil et al., 2009). The researchers also found that women with diabetes but no depression during pregnancy were more likely to develop postpartum depression (OR = 1.69, 95% CI [1.27, 2.23]). However, this study included a sample comprised of women on Medicaid and women with all types of diabetes (type 1, type 2, and GDM).

Pregnant women who have GDM and depression are at greater risk for possible negative outcomes. Pregnant women who were depressed were more likely to practice unhealthy behaviors such as smoking and alcohol use and to miss prenatal care visits (Kelly et al., 1999; Marcus, Flynn, Blow, & Barry, 2003). Also, poor management of GDM increases the possibility of complications such as macrosomia and infant hypoglycemia (The HAPO Study Cooperative Research Group, 2008). If de-

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Twenty percent of women with gestational diabetes and 13% without gestational diabetes had significant depression symptoms suggesting the need for antenatal depression screening.

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pression is a contributing reason for poor management of GDM, diagnosing and treating the depression may decrease the chance of comorbid complications (Byrn & Penckofer, 2013). Therefore, investigating the potential relationship between antenatal depression and GDM to improve the care of women with GDM and reduce negative outcomes in these women and their infants is essential (Byrn & Penckofer, 2013). The purpose of this study was to determine if women with GDM had more symptoms of depression than women without GDM and to determine if predictive factors of symptoms of depression (state anxiety, trait anxiety, perceived stress, GDM, age, marital status, and socioeconomic status) in women with GDM were different from women without gestational diabetes.

Methods

Theoretical Framework

The biopsychosocial model developed by George Engel (1977) was used to guide the study. This model includes the biological, psychological, and sociological effects incorporated with disease. In the this model, the biological, psychological, and sociological components of a person are all equally important when treating an illness A benefit of the biopsychosocial model is that it allows the researcher or clinician to consider the person as a whole, including quality of life, social role performance, and emotional status during evaluation of a patient (Fava & Sonino, 2008). The biopsychosocial model has been used to study depression (Covinsky & Landefeld, 1996) and diabetes (Peyrot, McMurry, & Kruger, 1999).

Design and Participants

A cross sectional design was used to address the study aims. The study was approved by the Institutional Review Board at the institution where data were collected. A convenience sampling of women attending a routine prenatal care visit was used. Inclusion criteria included women who received prenatal care at the research sites, were between 24 and 40 weeks gestation, spoke and read English, had medical data to verify GDM diagnosis, and were older than age 18 years. The exclusion criteria were women younger than age