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Lifestyle interventions to reduce risk of diabetes among women with prior gestational diabetes mellitus

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While lifestyle interventions involving exercise and a healthy diet in high-risk adults have been found to reduce progression to type 2 diabetes by >50%, little attention has been given to the potential benefits of such strategies in women with a history of gestational diabetes mellitus (GDM). We conducted a literature search of PubMed for English language studies of randomized controlled trials of lifestyle interventions among women with a history of GDM. In total, nine studies were identified which fulfilled the eligibility criteria. The majority of randomized trials of lifestyle interventions in women with GDM have been limited to pilot or feasibility studies. However, preliminary findings suggest that such interventions can improve diabetes risk factors in women with a history of GDM. Larger, well-designed controlled randomized trials are needed to assess the effects of lifestyle interventions on preventing subsequent progression to type 2 diabetes among women with GDM.

Background

Type 2 diabetes is a global epidemic. Worldwide, the total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 [1]. At the same time, the age at onset

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for type 2 diabetes is decreasing [2] highlighting the importance of identifying high-risk groups early, in order to implement prevention efforts. One such high-risk group is women who develop glucose intolerance during pregnancy. Both gestational diabetes mellitus (GDM) and milder glucose intolerance in pregnancy identify women who are at a high risk of subsequent glucose intolerance and type 2 diabetes. [3,4]

GDM is one of the most common complications of pregnancy with a prevalence rate varying from 1% to 20% depending on the population studied and diagnostic criteria applied [2,5]. With the recent adoption of the International Association of Diabetes and Pregnancy Study Groups Consensus Panel (IADPSG) diagnostic criteria, it is estimated that 18% of pregnant women will be diagnosed with GDM [5]. Obesity is strongly associated with the risk of GDM [6], and it is expected that the incidence of GDM among women of reproductive age will further increase as the prevalence of obesity continues to rise among this age group.

GDM is related to short- and long-term adverse health outcomes for the mother. Compared with women with healthy pregnancies, women with histories of GDM have elevated cardiovascular disease (CVD) risk factors including higher blood pressure, triglyceride levels, and lower high-density lipoprotein (HDL) [7]. Consistent with these findings, a meta-analysis found that GDM confers a sevenfold risk of future type 2 diabetes [8] and up to one-third of women with type 2 diabetes have previously been diagnosed with GDM [9].

According to a systematic review, the highest risk period for the development of type 2 diabetes is within the first 5 years after a GDM pregnancy [3] with 50% of Hispanic women developing type 2 diabetes within 5 years [10]. Furthermore, a growing body of evidence shows a rapid postpartum change in CVD risk factors [11]. For example, Retnakaran et al. found that by 12 months post partum, 17.1% of those with recent GDM and 10% of women with milder degrees of gestational glucose intolerance had progressed to prediabetes or diabetes [12].

Therefore, pregnancy can unveil a preexisting susceptibility for type 2 diabetes and offers the opportunity to implement interventions to decrease such a risk. However, while lifestyle interventions involving exercise and a healthy diet in high-risk adults have been found to reduce progression to type 2 diabetes by >50% [13–16], little attention has been given to the potential benefits of such strategies in women with a history of GDM. Indeed, studies of diabetes prevention among such high-risk pregnant and postpartum women are sparse. Collectively, the prior body of evidence suggests that such lifestyle interventions, if delivered to women with a history of GDM, would have the potential to delay or prevent one-sixth of type 2 diabetes cases in the female population [17].

Therefore, the goal of this review is to provide researchers and practitioners with a comprehensive overview of the randomized controlled trials of lifestyle interventions designed to reduce the risk of diabetes or diabetes risk factors among women with a history of GDM. To this end, the review first describes the impact of the lifestyle interventions on the incidence of type 2 diabetes and biomarkers of insulin resistance, weight change, and healthy behaviors such as physical activity, diet, and breastfeeding. The review then goes on to describe the study design and methods of new randomized trials which have been recently launched. The review concludes with a summary and recommendations for future research and practice.

Methods

We conducted a literature search of PubMed for English language studies of randomized controlled trials of lifestyle interventions among women with a history of GDM. Only published peer-reviewed journal articles of original research in the English language were included. Keyword searches included the following: lifestyle intervention, randomized controlled trial, type 2 diabetes, prevention, diet, physical activity, postpartum, pregnancy, weight retention, GDM, and health behaviors. Additional relevant articles cited in the reference lists of identified papers were retrieved manually.

In total, nine randomized controlled trials of lifestyle interventions conducted among women with a history of GDM were identified to fulfill the eligibility criteria (Tables 1 and 2) [18–24].

Of these studies, two examined the impact of the lifestyle intervention on the subsequent incidence of diabetes [23,25], and four examined the impact on postpartum biomarkers of insulin resistance [20–22,26].