

Impact of Physical Activity on Gestational Diabetes

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Introduction

Gestational diabetes mellitus (GDM) is one of the most common complications of pregnancy and is associated with a significantly increased risk of adverse health outcomes for both the mother and the fetus. Physical activity can contribute to the prevention of GDM.

Objective

To review studies from Medline, EMBASE, and Cochrane from April 1, 2017, to March 31, 2023. Studies assessing the association between physical activity and the subsequent development of GDM were included. Diagnostic criteria for GDM, the definition of physical activity, timing of exposure (before pregnancy or early pregnancy), adjusted relative risks, and statistical methods were obtained from independent sources.

Materials and Methods

Relevant published articles in English were identified through a search of the Medline, EMBASE, and Cochrane Reviews databases from April 2017, and by manual checking of bibliographies. The Medline search was conducted as follows using similar terms for the other databases: (diabetes, gestational) AND (lifestyle, "risk factor," or physical activity OR physical exercise). Bibliographies of accepted studies and recent reviews were reviewed to obtain a comprehensive list of studies.

Results

The results of our systematic literature review show that higher overall physical activity before pregnancy or in early pregnancy was significantly associated with a lower risk of developing GDM. The strongest association was found with physical activity before pregnancy: women in the highest quintile of activity had a 55% lower risk compared to those in the lowest activity group. There was substantial heterogeneity in study results, suggesting that differences between population groups or study methodologies may have influenced the outcomes. Our analyses to identify sources of heterogeneity were likely insufficient as only a few studies were conducted in each group. However, removing individual influential studies did not significantly change our results, which supports the reliability of the pooled estimate. Physical activity in early pregnancy was also associated with a statistically significant 25% reduction in risk among women with high levels of physical activity.

Normal pregnancy involves increased metabolic stress and disturbances in lipid and glucose homeostasis during the third trimester. Maternal muscles exhibit significant insulin resistance to increase glucose availability for the developing fetus. The development of GDM may reflect an impaired ability to cope with such metabolic challenges, such as underlying β -cell dysfunction. Thus, women better prepared to handle metabolic stress are more likely to maintain normal glucose levels. The inverse association we observed between physical activity and the development of GDM is biologically plausible. Studies among non-pregnant individuals have shown that exercise-induced improvements in glycemic control may be related to increased GLUT4 content, a glucose transporter protein. Physical activity also directly affects oxidative stress and endothelial function. It has been shown that reducing fat mass and increasing muscle mass positively impact glycemic control.

Conclusions

The results of this systematic review and analysis demonstrate that greater overall physical activity before or during early pregnancy is significantly associated with a lower risk of GDM, with a stronger association for physical activity before pregnancy. Given the consistent evidence from several studies, promoting physical activity among women of reproductive age could be a promising approach to preventing GDM and subsequent complications in children born to pregnancies affected by GDM.