



# Effect of Regular Exercise Commenced in Early Pregnancy on the Incidence of Gestational Diabetes Mellitus in Overweight and Obese Pregnant Women: A Randomized Controlled Trial

Diabetes Care 2016;39:e163–e164 | DOI: 10.2337/dc16-1320

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Gestational diabetes mellitus (GDM) is a common complication in pregnancy that is associated with a higher risk of adverse health outcomes for mothers and offspring, not only during the perinatal phase but also in the long term, well into future generations. Exercise has been confirmed as effective in delaying the progression of glucose intolerance in type 2 diabetes. However, whether exercise is effective for the prevention of GDM is not clear because the few randomized controlled trials (RCTs) investigating this issue show conflicting results (1). Therefore, we conducted an RCT (NCT02304718) to evaluate whether regular cycling commenced in early pregnancy could reduce the incidence of GDM in Chinese pregnant women.

A total of 300 singleton pregnant women with a mean prepregnancy BMI of  $26.78 \pm 2.75$  kg/m<sup>2</sup> before 12<sup>+6</sup> gestational weeks were recruited and randomly allocated into either an exercise intervention group (EG) or a control group (CG) in a 1:1 ratio. Participants allocated to the CG continued with their usual daily activities, whereas participants randomized to the EG engaged in a supervised cycling program (3 times/week). During an average

intervention period of  $16 \pm 2$  weeks, 132 out of 150 women in the EG and 133 out of 150 women in the CG underwent 75-g oral glucose tolerance tests (OGTTs), and the incidence of GDM was 22.0% (29/132) in the EG and 40.6% (54/133) in the CG. Furthermore, the EG had lower blood glucose levels at 0 h, 1 h, and 2 h of the postintervention 75-g OGTT compared with the CG ( $P = 0.001$ ,  $P = 0.009$ ,  $P = 0.009$ , respectively) (Table 1). Following the intervention, women randomized to the EG had less gestational weight gain compared with those in the CG ( $4.08 \pm 3.02$  vs.  $5.92 \pm 2.58$ ;  $P < 0.001$ ), and their insulin resistance level (HOMA of insulin resistance) was significantly lower than of those in the CG ( $2.92 \pm 1.27$  vs.  $3.38 \pm 2.00$ ;  $P = 0.033$ ) in the second trimester.

Our study was the first RCT carried out in China to assess the effectiveness of regular exercise for preventing GDM, and it demonstrated a high ability of exercise to reduce GDM risk and improve glucose metabolism. These positive results may be attributed to the supervision of the program, which ensured the exercise intensity and high level of adherence. Moreover, starting the intervention early in pregnancy may have played an important role in the effectiveness of our protocol. The UK Pregnancies: Better Eating and Activity Trial (UPBEAT) (2) and the pilot study of Vitamin D And Lifestyle Intervention for Gestational Diabetes Mellitus Prevention (DALI) (3) both failed to prove the efficacy of exercise for reducing the incidence of GDM in women with obesity. However, the

**Table 1—GDM incidence and 75-g OGTT blood glucose levels**

	EG (n = 132)	CG (n = 133)	P
GDM incidence	29 (22.0)	54 (40.6)	<0.001
75-g OGTT blood glucose level (mmol/L)			
0 h	$4.76 \pm 0.41$	$4.96 \pm 0.51$	0.001
1 h	$7.99 \pm 1.67$	$8.57 \pm 1.86$	0.009
2 h	$6.57 \pm 1.18$	$7.03 \pm 1.62$	0.009

Data are n (%) or mean  $\pm$  SD.

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Received 20 June 2016 and accepted 4 July 2016.

Clinical trial reg. no. NCT02304718, clinicaltrials.gov.

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exercise was not supervised and both trials initiated the interventions in the second trimester, which may be too late to prevent the development of GDM (4). This notion is supported by a meta-analysis suggesting that prepregnancy exercise may have a greater role in reducing the risk of developing GDM than exercise started in early pregnancy (5). Generally, the amount of physical activity during pregnancy is low. Thus, more concern needs to be paid to find a practical way to improve the level of physical activity during pregnancy. Furthermore, studies targeted on different ethnic groups are still needed to give more specific recommendations.

**Funding.** This study was supported by “The role of exercise on preventing the development of gestational diabetes mellitus in overweight and obese pregnant women” from the Capital Characteristic

Clinical Application Research (Z151100004015088) and “Diabetes management beyond pregnancy” from the World Diabetes Foundation (WDF 14-908).

**Duality of Interest.** No potential conflicts of interest relevant to this article were reported.

**Author Contributions.** C.W., Y.W., K.J.G., J.P.N., and H.Y. were involved in the initial study design and drafted the protocol. C.W. had overall responsibility for trial management and statistical analysis. Y.W. and H.Y. secured funding and had overall responsibility for the study. X.Z., Y.Z., Q.X., S.S., L.Z., C.L., Y.F., and C.S. were involved in the collection of data. C.W. and Y.W. wrote the original draft of the manuscript. C.S., K.J.G., J.P.N., and H.Y. were involved in revising the manuscript for important intellectual content. All authors read and approved the final manuscript. H.Y. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Prior Presentation.** This study was presented in abstract form at the 1st South Asia and Asia Pacific International Congress on Diabetes in Pregnancy, Colombo, Sri Lanka, 8–10 September 2016.

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