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Supervised Exercise–Based Intervention to Prevent Excessive Gestational Weight Gain: A Randomized Controlled Trial

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Abstract

Objective: To study the effect on maternal weight gain of a supervised light- to moderate-intensity exercise–based intervention performed from the ninth week of pregnancy.

Participants and Methods: A total of 962 healthy pregnant women were randomly assigned to a standard care or exercise intervention group conducted between September 1, 2007, and January 31, 2011. The intervention included light- to moderate-intensity aerobic and resistance exercises performed 3 days a week (50-55 minutes per session). Excessive gestational weight gain was calculated on the basis of the 2009 Institute of Medicine (IOM) recommendations. Gestational body weight gain was calculated on the basis of the weight measured at the first prenatal visit (fifth to sixth weeks of gestation) and weight measured at the last visit to the clinic before delivery. Women were categorized into normal weight or overweight or obese.

Results: Women in the intervention group gained less weight (adjusted mean difference, 1.039 kg; 95% CI, 0.534-1.545 kg; $P<.001$) and were less likely to gain weight above the IOM recommendations (odds ratio, 0.625; 95% CI, 0.461-0.847) compared with those in the standard care group. The main treatment effects according to body mass index category were that normal weight women in the intervention group gained less weight (adjusted mean difference, 1.393 kg; 95% CI, 0.813-1.972 kg; $P<.001$) and were less likely to gain weight above the IOM recommendations (odds ratio, 0.508; 95% CI, 0.334-0.774) than normal weight women who received standard care. No significant treatment effect was observed in overweight or obese women.

Conclusion: Supervised exercise of light to moderate intensity can be used to prevent excessive gestational weight gain, especially in normal weight women.

Trial registration: clinicaltrials.gov Identifier: NCT01790347

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Excessive gestational weight gain increases the risk of adverse outcomes, such as gestational hypertension, diabetes mellitus, preeclampsia, preterm birth, high postpartum weight retention, long-term obesity, and the need for cesarean delivery.[1-3] Excessive gestational weight gain also has detrimental consequences for infants' health in general.[4] A meta-analysis has found that exceeding the recommended gestational weight gain increases the risk of childhood overweight by approximately 30%.[5] Ensenauer et al[6] recently found in a 6837-person mother-child cohort that excessive gestational weight gain was associated with an increased risk of not only offspring overweight but also offspring abdominal adiposity. Gestational weight gain has also been associated with offspring cognition.[7] Thus, interventions focused on preventing excessive gestational weight gain are important for the health of both the mother and the infant.

The American College of Obstetricians and Gynecologists emphasizes the need to limit excessive weight gain to ensure the health of a woman and her infant.[8] Despite available evidence supporting the promotion of prenatal physical activity to bring about health benefits for both mother and child,[9,10] the most effective way of preventing excessive gestational weight gain is not clear. Whereas interventions that combine nutritional counseling, a supervised physical activity program, and a behavioral change approach might be the most successful, several factors, including the type of intervention

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(telephone-based, mailed-based, or supervised intervention) and frequency of the interaction with the women, might determine success. Ruchat and Mottola[11] recently highlighted that supervised exercise–based interventions typically allow frequent interaction with the women involved, which increases safety and adherence to the program and allows them to be constantly informed about the health benefits of regular physical activity during pregnancy.

The primary aim of this randomized controlled trial (RCT) was to study the effect on gestational weight gain of a supervised, light- to moderate-intensity aerobic and resistance exercise–based intervention performed 3 times a week (50-55 minutes per session) from the ninth week of gestation. We also studied whether gestational weight gain differed according to pregravid weight status. In a secondary analysis, we examined the effect of exercise on maternal and fetal outcomes and delivery complications.

PARTICIPANTS AND METHODS

The present RCT (clinicaltrials.gov identifier NCT01790347) was conducted from September 1, 2007, through January 31, 2011, and followed the ethical guidelines of the Declaration of Helsinki (modified in 2000). The institutional review board of the Hospital Universitario de Fuenlabrada (Madrid, Spain) reviewed and approved the study design and research protocol.

Study Population

The study participants were recruited by nurses at 3 primary care medical centers in Madrid, Spain (Centro de Salud Los Pedroches, Centro de Salud Leganés Norte, and Centro de Salud El Arroyo), during the first prenatal visit (fifth to sixth weeks of gestation). A total of 2350 women were informed about the nature of the study, and those who were sedentary (not exercising for >20 minutes on >3 days a week), with singleton and uncomplicated gestations, not at high risk of preterm delivery (ie, ≤1 previous preterm delivery), and not participating in any other trial were invited to participate in this study. Women with any obstetric contraindication to exercise were not eligible to participate in the study. Eligible women who were willing to participate provided written informed consent before joining the study and then completed a baseline assessment at the medical center, after which they were randomly assigned to the standard care (control) or intervention group. Randomization assessment was computer generated.

Standard Care Group (Control)

The women assigned to the standard care group attended their regular scheduled visits to their obstetricians and midwives, usually every 4 to 5 weeks until the 35th week of gestation and then weekly until delivery. They received general nutrition and physical activity counseling from health care professionals and were not discouraged from exercising on their own.

Exercise Intervention

The women in the intervention group received all aspects of standard care plus a structured, supervised, light- to moderate-intensity 50- to 55-minute exercise intervention program 3 days a week (Monday, Wednesday, and Friday) from week 9 to weeks 38 to 39. A mean of 85 training sessions were planned for each participant in the event of no preterm delivery. The intervention met the recommendations of the American College of Obstetricians and Gynecologists[12] and involved light- to moderate-intensity aerobic, resistance, and flexibility exercises. Exercise intensity was controlled by heart rate monitors (Accurex Plus; Polar Electro OY) during the exercise sessions and by the Borg conventional 6- to 20-point scale for the rate of perceived exertion.[13] The women's heart rate was consistently less than 60% of their age-predicted maximum heart rate (208 − [0.7 × age in years]), and rate of perceived exertion ranged from 10 to 12 (fairly light to somewhat hard, respectively).

The exercise session started with a light-intensity, 10-minute warm-up that consisted of walking and static stretching (avoiding muscle pain) of most muscle groups (upper and lower limbs and neck and trunk muscles). Similarly, the exercise session finished with a light-intensity, 10-minute colldown, including the same exercises as the warm-up period plus relaxation and pelvic floor exercises.

The core section of the exercise session lasted 25 to 30 minutes and included moderate-intensity aerobic exercises once a week (usually on Friday) and resistance exercises twice a week (usually on Monday and Wednesday). Aerobic