Weight Gain Recommendations in Pregnancy and the Obesity Epidemic

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Excessive gestational weight gain and obesity have been recognized as independent risk factors for maternal and fetal complications of pregnancy with significant lifelong consequences. These associations call into question the recently released Institute of Medicine (IOM) gestational weight gain recommendations, particularly for obese women. The IOM recommendation of a single standard of weight gain for all obesity classes is also of concern, because higher body mass index levels are associated with more severe pregnancy complications, such as preeclampsia and gestational diabetes. The IOM recommendations retained the 1990 focus on the theoretical association between poor gestational weight gain and low birth weight (LBW). Low gestational weight gain may often be a consequence and not the cause of LBW, and there is a lack of evidence in developed countries that dietary supplementation increases birth weight. Current obstetric practice allows for accurate and timely diagnosis of and intervention for LBW. We submit that gestational weight gain recommendations should be more individualized especially for obese women. Obese pregnant women should not be precluded from partaking in healthy lifestyle modifications in pregnancy that include physical activities, modified, judicious diets, and limited weight gain.

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The epidemic of obesity in the Western world, particularly the United States, continues unabated.1 Sixty-six percent of U.S. adults were classified as overweight or obese in 2004, including 29% of reproductive-age women (20–39 years). Obesity affects a disproportionate percentage of Mexican-American (36%) and African-American (50%) women. As a chronic disease, obesity contributes to more than 100,000 deaths per year and is recognized as a leading cause of premature mortality in women in the United States.2 Excessive gestational weight gain and obesity have been recognized as independent risk factors for maternal and fetal complications of pregnancy. This association calls into question the recently released recommendations by the Institute of Medicine (IOM).3 We do not concur with the committee recommendations for reasons detailed below. Since the first publication by the IOM in 1990 of its gestational weight gain recommendations, there has been a 70% increase in the prevalence of prepregnancy obesity. A large percentage of obese individuals will experience comorbidities in their life span. As many as 76% of African-American women enrolled in an outpatient weight loss program had one or more comorbidities.4 Among the major medical comorbidities are hypertension, cardiovascular disease, diabetes mellitus, hyperlipidemia, metabolic syndrome, thromboembolic events, and cancers. Pregnancy-related, obesity-associated morbidities include diabetes, macrosomia, cesarean delivery, preeclampsia, and congenital anomalies. Most concerning is the parallel increase in gestational diabetes.5

The recently published IOM recommendations for gestational weight gain are virtually identical to those published in 1990, with one exception: obese women (body mass index [BMI] greater than 30) are now recommended to gain 11–20 lb compared with the previous recommendations of at least 15 lb.3 The IOM committee did not stratify the recommendations for different obesity classes (ie, class I [BMI 30–34.9], class 2 [BMI 35–39.9], and class 3 [BMI greater than 40]). Compared with data from two decades ago, the rate of individuals with a BMI greater than 30 and, more significantly, the rates of adults with a BMI...
greater than 40 (morbid obesity or class 3) have significantly increased. The National Health and Nutrition Examination Survey reported in 2003–2004 that 28.9% of women of reproductive age (20–39 years) were obese, and 8% were morbidly obese. Recommending a single standard of weight gain for all obesity classes is of concern because higher BMI levels are associated with more severe comorbidities and have long-term adverse health implications.

An association has been established among excessive gestational weight gain, pregnancy complications, and retention of weight after pregnancy. More than 60% of previous gravidas become overweight with their subsequent pregnancies. Weight gain during pregnancy and the effect on subsequent weight gain are causes of a permanent increase in weight for every BMI category and are significant contributors to the obesity epidemic and associated comorbidities in the United States. Excessive gestational weight gain has been implicated in an intergenerational “vicious cycle” of obesity as overweight or obese women give birth to macrosomic daughters, who are more likely to become obese themselves and deliver large neonates.

The expert multidisciplinary panel commissioned by the IOM to address gestational weight gain recommendations compiled a comprehensive review of the literature that provided the background for the recently published recommendations. The current and previous recommendations were based on expert opinion, observational studies, and population-based small and large cohort studies. The 2009 IOM committee retained the same scientific approach and epidemiologic conventions used in their 1990 report. The recommendations were in part driven by a theoretical association between poor gestational weight gain and low birth weight (fetal growth restriction). However, low gestational weight gain often may be a consequence of a medical or obstetric condition and not the cause of low birth weight. Further, the recommendations do not consider the long-term effects of excess pregnancy-associated weight gain. Gestational weight gain should reflect a balance between an optimal outcome for the fetus and mother alike. Hence, we have concern about the recommendation of additional weight gain for all classes of obese gravidas. Reaffirmation of the IOM 1990 recommendations has the potential to amplify pregnancy-related risk for mother and fetus and long-term morbidities for women.

The challenge in establishing optimal weight gain recommendations in pregnancy for the general population is by and large because of the great variability in gestational weight gain found even among women with similar ages, BMI, socioeconomic status, ethnic and cultural background, tobacco use, and levels of physical activity. Thus, if for no other reason, recommendations for gestational weight gain should be individualized and based on clinical judgment as recognized by the panel, especially for obesity classes I–III.

Currently, the wide use of ultrasonography and other innovations allow for a more accurate and timely diagnosis, testing, and intervention for fetal growth restriction. The IOM committee’s adherence to its previously published recommendations that focus on theoretical prevention of low birth weight due to deficient nutrition is biologically insupportable given affluent Western diets. Indeed, undernutrition in pregnancy, if it has any effect, will be observed in those women who are underweight. Poor gestational weight gain is unlikely to affect birth weights in overweight and obese women. Moreover, even under the most nutritionally deprived conditions, such as occurred during the World War II famine in Leningrad and Holland, women who maintained diets of less than 1,000 cal/d experienced reduced birth weights of only 440–600 g.

For obese or overweight pregnant women, comorbidities are significantly more common, including a higher prevalence of diabetes, hypertension, operative deliveries, and macrosomia and neonatal complications. Studies have consistently demonstrated that increased prepregnancy BMI followed by excessive weight gain in pregnancy are significant risk factors for developing gestational diabetes and pre-eclampsia; conversely, limited weight gain in overweight or obese pregnant women decreases the risk of these complications.

Dye et al used a central New York Regional Perinatal data system for a population cohort study that included 14,367 pregnant women. This study reported a prevalence of gestational diabetes mellitus of 4–6% for obesity class I, 6–8% for obesity class II, and 10–12% for obesity class III. This study also reported that lifestyle modifications in pregnancy, such as physical activities, have a preventive role in the development of gestational diabetes mellitus in obese pregnant women. In another population-based cohort study, derived from 120,251 Missouri birth...
certificates (1990–2001), Kiel et al\textsuperscript{16} reported that for class II and III obese pregnant women, gestational weight gain of less than the recommended 11–20 lb is associated with a significantly lower risk of preeclampsia, cesarean delivery, and large-for-gestational-age birth, whereas the risk for low birth weight increased significantly for these patients only when weight loss in pregnancy exceeded prepregnancy weight by 10 lb. Moreover, this study was not controlled for other causes for inadequate gestational weight gain known to affect fetal growth (eg, cigarette smoking, socioeconomic status, use of illegal substances).

In another recently published study, it was reported that obese pregnant women who gained 15 lb or more during pregnancy experienced more pregnancy-related comorbidities compared with those who gained fewer than 15 lb.\textsuperscript{17} In a 2007 large Swedish population cohort study that included nearly 300,000 women, it was reported that limited gestational weight gain (less than 6 kg) was associated with better pregnancy outcomes for overweight and obese women with BMIs higher than 30.\textsuperscript{13}

The IOM committee also reemphasized an historic concern that restricting weight gain in pregnancy could result in ketonuria or ketonemia, causing adverse fetal neurodevelopmental effects. This cause and effect concern has been discredited. The issue of maternal ketonuria and potential effects originates in one single study.\textsuperscript{14} The study was criticized for its improper design because the data were obtained from different hospitals, with a nurse obtaining a single sample of urine for ketone testing on the day of delivery; also, maternal IQ, the major predictor of child IQ, was not evaluated. Subsequent studies also have suggested no effect on the neuropsychological development of offspring of women who experienced ketonuria during pregnancy.\textsuperscript{18}

The optimal diet prescription for pregnant women should provide adequate calories and nutrients to support fetal growth. The diet should be tailored for women of different classes of obesity by recommending a nutrient-dense caloric intake in the range of 2,000–2,500 cal/d. This caloric intake results in a gestational weight gain of 10 lb or less and, in some, a net negative weight gain. Limited weight gain in obese pregnant women has the added potential for setting the foundation for a healthier lifestyle over the lifespan of women, including interconceptionally and during subsequent pregnancies.\textsuperscript{19}

Although a vigorous exercise and weight loss program perhaps should not be the goal during pregnancy, obese and morbidly obese women should not be precluded from partaking in healthy lifestyle modifications in pregnancy, which include physical activities and judiciously modified diets and limited weight gain. Such interventions, although limited, have been used safely and successfully in overweight and obese women.\textsuperscript{19}

Similar to smoking-cessation programs, pregnancy provides a unique and ideal opportunity for behavior modification given high motivation and enhanced access to medical supervision. All women should try to avoid excess weight gain during pregnancy, with the goal of normalizing the BMI between pregnancies to minimize risk of adverse outcomes in future pregnancies and an improvement in general long-term health. Pregnancy is an optimal time for health care providers to offer their resources to decrease maternal obesity and comorbidities, thus affecting current and future generations.

REFERENCES


