Food Supplementation during Pregnancy and Functional Outcomes

For at least 65 years, nutritionists, physicians, and public-health policy-makers have studied the impact of food supplementation to pregnant women who are undernourished or otherwise at risk for adverse pregnancy outcomes (1). Most of these studies on feeding supplementation have targeted an increase in the birth-weight of the offspring, based on the well-established relationship between higher birth-weight (at least up to an optimal birth-weight rarely attained in developing countries) and increased survival, reduced morbidity, and more recently, even perhaps a lower risk of long-term chronic diseases of adults, such as hypertension, type 2 diabetes, and coronary heart disease (2,3). Gestational maturity is a far more important predictor of infant (and especially neonatal) mortality and severe morbidity than is size for gestational age, and thus, the relationship between birth-weight and these outcomes is primarily due to the close correlation between birth-weight and gestational age (4). Since food supplementation during pregnancy has not been shown to prolong gestation, most of the presumed benefit arises from an increase in the size of infants born at term (5). One important exception is the Gambian supplementation trial, which succeeded in reducing both stillbirth and neonatal death by providing a much higher net increase in energy intake than any other of such trials (6).

Although an increase in size of term infants may be beneficial, randomized trials have not shown a benefit of maternal food supplementation on long-term growth or functional outcomes in children (5). Moreover, recent data from Yajnik et al. suggest that Indian newborns who are growth-restricted compared to newborns in the UK have a relatively normal fat mass (7). These data raise the warning that increasing the size of South Asian infants might increase fat mass without adding substantially to bone, muscle, or other lean body tissue, with potentially adverse long-term consequences (insulin resistance and type 2 diabetes) in later childhood and adulthood. All this is to say that the goals of providing food supplementation, even if targeted to thin women in countries like Bangladesh and India, must clearly consider medium- and long-term functional outcomes in the offspring, not merely an increase in birth-weight.

However, has the Bangladesh Integrated Nutrition Project (BINP) actually resulted in an increase in birth-weight or a reduction in low birth-weight? As Ortolano and her colleagues obviously recognize in their article in this issue of JHPN, a randomized trial design would provide the best answer to such a question (8). One could ask whether another such randomized trial is needed in a country like Bangladesh. There is no reason to suspect that the previously-demonstrated effects of food supplementation would not also have a positive impact on foetal growth among Bangladeshi pregnant women. The research design used in this study is highly unusual, however. The intervention was not randomized, nor was the intervention group compared with a similar group of women elsewhere in the country or region who did not receive the supplement, nor even with a historical group of similar women who gave birth prior to the intervention. Instead, the authors elected to feed all women who met their eligibility criterion (body mass index [BMI] <18.5 kg/m² at the time of registration) and compared weight gain and birth-weight (without respect to gestational age, presumably because the latter was unavailable or felt to be inaccurate) with those outcomes in women with higher baseline BMIs (and therefore not ‘eligible’ for the supplement), who generally came from more socioeconomically favourable households. What the authors have reported based on this unusual design is that the thinner, poorer women who were supplemented had a higher average gestational weight gain (in kg per week) and similar birth-weight distribution compared with the better off-mothers who did not receive the supplement.
Although the authors were surprised by this ‘success’, their result provides relatively weak evidence that their supplement was as effective as they have inferred. First, pre-pregnancy BMI (or even early-pregnancy BMI, used here as a proxy) is often inversely associated with gestational weight gain (9, 10). In other words, the thinner women are when they enter pregnancy, the more weight they tend to gain during pregnancy, presumably as a physiologic compensatory mechanism for pre-pregnancy under-nutrition. Second, the authors provide no information on the extent to which the BINP supplement replaced, rather than added to, the women’s normal dietary intake. Thus, there is no assurance that energy intake and subsequent weight gain were higher in the supplemented group than they would have been in the absence of the supplement. Finally, only 224 of the 456 women included in the study had recorded birth-weights, creating a strong potential for bias in reporting of birth-weight if women who received the supplement and had a low-birth-weight infant did not have the birth-weight recorded, perhaps to avoid conveying ‘bad news’ to the providers of the supplement and to the investigators.

In summary, inference of the investigators that the BINP actually led to higher weight gains or higher birth-weights in supplemented women is undermined by methodologic weaknesses in their study. Nonetheless, there is no reason to doubt that, unless the supplement entirely substituted for (i.e. resulted in a compensatory reduction in) the usual diet, it would have led to modest increases in foetal growth similar to those reported in rigorously controlled trials. As noted at the beginning of this editorial, the more important question is: even if foetal growth was increased as a result of the BINP, what are the long-term benefits, if any? Future studies on maternal food supplementation should go beyond the conventional goals of increasing maternal weight gain and birth-weight and focus on important functional outcomes for children, adults, and future generations.

REFERENCES

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